AFGL-TR-88-0326

DESIGN OF SCIENTIFIC PAYLOADS AND COMPONENTS

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Final Report
December 1982 - June 1988

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Approved for public release; distribution unlimited

AIR FORCE GEOPHYSICS LABORATORY
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
HANSCOM AFB, MASSACHUSETTS 01731-5000

"This technical report has been reviewed and is approved for publication"

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FOR THE COMMANDER

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19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

Summarized in this report is the work performed under Contract F19628-83-C-0014, from December 1982 through June 1988. Efforts consisted of design and fabrication of one-of-a-kind payloads and instruments, field launch services, and refurbishment of recovered payloads and instruments.

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Table of Contents

1.0 Introduction

Summarized in this report is the work performed under Contract F19628-83-C-0014 from December 1982 into June 1988. (An extension was granted on Modification P00052, November 3, 1987, making the period of work 66 months). Efforts consisted of design and fabrication of one-of-a-kind payloads and flight instruments, ground equipment, field launch services and refurbishment of recovered payloads and instruments.

1.1 Program Summary

Wentworth's primary task accomplished under Contract F19628-83-C-0014 was to provide design, engineering and fabrication support for AFGL toward the development of payloads for infrared measurements and other physical science experiments in space. Specific services provided included mechanical design and analysis of mechanical pieces and electro-mechanical devices, devlopment of cost effective fabrication techniques, testing and field support of the hardware. Also provided were the design, fabrication, assembly, testing and integration of electronic devices including PCB's and their circuitry. Wentworth's long experience in payload support contributed to being a cost effective supplier of diverse services at close proximity to AFGL. The results of this

contract added to the existing success record and expertise of Wentworth and enabled us to win the succeeding contract with AFGL, F19628-88-C-0031.

2.0 Projects

An overview of forty projects that Wentworth participated in is presented in this section. Additional projects that Wentworth was involved in to a lesser degree are listed in 2.41.

The format by which these projects are reviewed is as follows:

Title - Acronym or project name.

( ) - Digitized code number for project from AFGL or 3 digit project number from WIT's Contract Reporting System.

Dates - Period of time during which work was performed by WIT.

Configuration/Mission - Launch vehicle, brief payload and mission description (when known).

Task Elements - Wentworth's level of effort in the project.

Summary - Results of Wentworth's efforts and launch date (if known).

2.1 Project BEAM (711) April 1983 - June 1985

2.1.1 Configuration/Mission - An ITT small lens tracker and backup Ball Brothers star tracker mounted in a door accessable payload on a Castor Lance Sounding Rocket.

2.1.2 Task Elements - Contract personnel designed and fabricated mechanical and electrical systems to package star trackers and associated instruments. Integration, testing and field support concluded with a launch in Natal, Brazil, June 18, 1985.

2.1.3 Summary - Launch attempt failed due to faulty separation in second stage.

2.2 Project CIRRIS April 1983 - June 1983

2.2.1 Configuration/Mission - A cap remover for the CIRRIS sensor was to be redesigned to improve reliability.

2.2.2 Task Elements - Bearings and lens screw were redesigned and integrated.

2.2.3 Summary - Mechanism tested successfully and delivered to AFGL.

2.3 Project ELC (A24.260) April 1983 - October 1983

2.3.1 Configuration/Mission - Refurbishment and modification of ZIP I, an infrared sensor on all ARIES sounding rocket.

2.3.2 Task/Elements - Contract personnel tested and re-equipped the payload components to prepare for another flight. Electronics maintenance section, rotation mechanism, and door latch were added or modified. Testing and integration were supported as well as field work at White Sands Missile Range, New Mexico. Launch was on October 25, 1983. Flight data examined, end of flight report generated.

2.3.3 Summary - All WIT equipment worked successfully.

2.4 Project BCD Systems April 1983 - October 1983

2.4.1 Configuration/Mission - Encoder Boxes to be carried by balloon launch.

2.4.2 Task Elements - Modify 5 PCM encoder electronic boxes.

2.4.3 Summary - Boxes, as modified, delivered to Hans Laping at AFGL.

2.5 Project BERT (A19.250-1) April 1983 - June 1985

2.5.1 Configuration/Mission - A mother/daughter payload configuration (BERT/ERNIE) which was instrumented with experiments and side mounted booms and sensors for conducting electron beam tests on a Nike Black Brant.

2.5.2 Task Elements - Contract personnel designed and fabricated mechanical and electrical systems for the five sections that made up BERT: Telemetry, Support SAADS, Mass Sprectrometer and Electron Guns. Testing and field support was provided.

2.5.3 Summary - All WIT equipment worked successfully. Launch was on June 15, 1985 from WSMR, New Mexico.

2.6 Project U.V. Measurements (755) April 1983 - Dec. 1983

2.6.1 Configuration/Mission - A sounding rocket payload carrying a photometer was to be refurbished and flown on an Aerobee.

2.6.2 Task Elements - Contract personnel fabricated a latch mechanism and can door, and refurbished other mechanisms from Project A04.902.

2.6.3 Summary - Launch resulted on April 19, 1983, at WSMR. All WIT equipment worked successfully.

2.7 SPICE III April 1983 - September 1983

2.7.1 Configuration/Mission - A reviously flown payload was returned to WIT.

2.7.2 Task Elements - Evaluate future use of payload.

2.7.3 Summary - Very little work in this time period.

2.8 LAIRTS (708) April 1983 - June 1985

2.8.1 Configuration/Mission - An infrared sensor/tele-

scope to be flown on the shuttle, FY91. Featured cryogenic cooling, rigid structure requirements and extensive electronics.

2.8.2 Task Elements - Contract personnel performed extensive weight, structural, scheduling and design studies to perfect a workable advance infrared sensor and supporting hardware.

2.8.3 Summary - Design never reached hardware phase due to funding cutbacks.

2.9 High Vacuum Pump April 1983 - September 1984

2.9.1 Configuration/Mission - A Honeywell High vacuum pump was to be modified for field use.

2.9.2 Task Elements - Contract personnel designed and modified the pump to make it more portable.

2.9.3 Summary - The modifications worked satisfactorily.

2.10 Project BAFWIF April 1983

2.10.1 Configuration/Mission - Maintenance support elements were to be provided to a payload built by Utah State for a Black Brant.

2.10.2 Task Elements - Field support at Poker Flat, Alaska for launch preparations.

2.10.3 Summary - Successful launch on April 12, 1983.

2.11 Project SCOOP Payload April 1983 - September 1983

2.11.1 Configuration/Mission - Determination of usefulness of Army/LTV payload to AFGL.

2.11.2 Task Elements - Design of single axis sensor drive system and pressure checks of payload section.

2.11.3 Summary

2.12 Project A20.327 April 1983

2.12.1 Configuration/Mission - Unknown

2.12.2 Task Elements - Support AFGL through fabrication

of assorted parts.

2.12.3 Summary - Minimal participation by WIT in this project.

2.13 Project BAFWIF II (719) April 1983 - December 1986

2.13.1 Configuration/Mission - Maintenance Support

Elements were to be provided to a payload built by Utah State for a Black Brant. Launch was to be into aurora phenomea.

2.13.2 Task Elements - Modification of a used Black Brant nose cone and test and preparation of the separation, recovery and delta velocity cans. Integration and field support were provided at AFGL and Poker Flats, Alaska during winter of 85-86 and winter of 86-87.

2.13.3 Summary - Launch was never accomplished due to no aurora of a certain magnitude occuring the two years funded.

2.14 Project LDEF (710) July 1983 - September 1983

2.14.1 Configuration/Mission - LDEF (Long Duration Exposure Facility) was a structure on which many different experiments which depended on a passive exposure to space. AFGL's experiment investigated the effects of exposure to materials and coatings by energized particles delivery to orbit by shuttle.

2.14.2 Task Elements - Design & fabricate hardware, provide documentation for completed piece, deliver flight housings to Langley.

2.14.3 Summary - Launch was on April 4, 1984. Recovery has been delayed.

2.15 Langmuir Sensor Probes (721 & 734) Oct 1983 - Sept 1985

2.15.1 Configuration/Mission - These sensor probes and associated electronics were originally intended for the CRRES satellite. Later applications for the probes have been found for other upper atmosphere missions.

2.15.2 Task Elements - Staff personnel designed, and fabricated the electron density probes and

associated ground support interface systems and interface boxes.

2.15.3 Summary - Hardware was delivered to AFGL on time and functioning properly.

2.16 ELC II (A24.261) Oct 1983 - Sept 1984

2.16.1 Cofiguration/Mission ELC II was to be a refurbishment of ELC, an aries sounding rocket payload.

2.16.2 Task Elements - Design studies were done on strengthening joints and mechanisms.

2.16.3 Summary - Further funding for design and fabrication/refurbishment was not forthcoming.

2.17 HARP (724) (A40.401) Jan 1984 - Dec 1985

2.17.1 Configuration/Mission - HARP was to be a test of a Brazilian motor with the Passive Super Fluid Concept (PSFC) as payload and Space Vector's recovery section.

2.17.2 Task Elements - Design and fabrication by staff personnel of a payload skin and other associated parts of the experiment and telemetry.

2.17.3 Summary - The PSFC was not finished in time for the launch, therefore, a ballasted payload section was furnished to the mission and successfully launched in November 1985.

2.18 Balloon BA (729) January 1984 - June 1984

2.18.1 Configuration/Mission - Unknown

2.18.2 Task Elements - Staff personnel designed and fabricated 5 electronics boxes for Hans Laping.

2.18.3 Summary - Flight results are unknown.

2.19 Passive Super Fluid Concept (PSFC) (723) April 1984 - September 1986

2.19.1 Configuration/Mission - The PSFC was intended to prove the concept of manufacturing super critical Helium at 1.8K for sensor cooling on sounding rockets and LAIRTS.

2.19.2 Task Elements - WIT to support AFGL in the design and fabrication of all associated parts on the PSFC such as dewars, plumbing, pressure vessels, heat exchangers.

2.19.3 Summary - Effort was terminated due to lack of AFGL scientific guidance and cancellation of LAIRTS.

2.20 Digital Command System (732) April 1984 - December 1985

2.20.1 Configuration/Mission - A system to run multiple commands on balloon payloads was required by Hans Laping of AFGL utilizing pulse code modulations.

2.20.2 Task Elements - Staff personnel designed and built various electronics boxes and components.

2.20.3 Summary - The original hardware and concepts were proven successfully on a flight and subsequent hardware was made for other missions.

2.21 CRRES (736) April 1984 - September 1985

2.21.1 Configuration/Mission - Combined release and radiation effects satellites are intended to measure induced chemical modifications of the upper atmosphere.

2.21.2 Task Elements - Staff personnel built to Analytyx specifications electronics and their support frames.

2.21.3 Summary - Parts were supplied on time to AFGL and its sub-contractor, Analytyx.

2.22 Balloon AW (725) October 1984 - June 1986

2.22.1 Configuration/Mission - A 36" diameter balloon payload.

2.22.2 Task Elements - Staff personnel designed and built racks, frames, mounting frames, doors, stiffeners and a crash ring.

2.22.3 Summary - Hardware delivered on time.

2.23 Stellar Scintillometer (748) Oct 1984 - Dec 1985

2.23.1 Configuration/Mission - Two scintillometers were to be made from an existing one for use on a Western U.S. ground based telescope.

2.23.2 Task Elements - Detail, from an existing part, new drawings and fabrication of two scintillometers.

2.23.3 Summary - Scintillometers were successfully tested on ground based equipment at Hanscom Air Force Base.

2.24 TAMP (750) January 1985 - December 1985

2.24.1 Configuration/Mission - To package the Scoop Sensor in the SPICE or ELC Payload.

2.24.2 Task Elements - Prepare design study and fabricate parts to accomodate sensor in payload.

2.24.3 Summary - Funding prematurely halted construction of most parts.

2.25 Test Array (749) April 1985 - September 1985

2.25.1 Configuration/Mission - Unknown

2.25.2 Task Elements - Various electronics parts such as PCB's & boxes were designed and built.

2.25.3 Summary - Hardware was delivered on time.

2.26 DMSP (752) April 1985 - September 1985

2.26.1 Configuration/Mission - Unknown

2.26.2 Task Elements - Design and fabrication of 5 electron electrometers.

2.26.3 Summary - Hardware delivered.

2.27 Balloon Repackaging (753) April 1985 - December 1985

2.27.1 Configuration/Mission - Balloon flight support equipment.

2.27.2 Task Elements - Staff personnel designed and built a portable electronics frame.

2.27.3 Summary - Equipment delivered on time.

2.28 VIPER (754) July 1985 - March 1988

2.28.1 Configuration/Mission - A visual photometric experiment packaged in GAS (Get Away Special) cannister for use on the shuttle.

2.28.2 Task Elements - Staff personnel designed and built the mechanical structure, and electronic packages and circuitry for control, positioning, diagnostics.

2.28.3 Summary - Delayed due to the shuttle's shutdown, flight is now scheduled for June 1989.

2.29 Plasma Studies (757) October 1985 - June 1988

2.29.1 Configuration/Mission - Support of general plasma studies.

2.29.2 Task Elements - Construction of additional sensor probes (721/734), their test equipment and handling hardware.

2.29.3 Summary - Up to nine probes were fabricated along with supporting hardware.

2.30 ALPHAN (756) October 1985 - December 1986

2.30.1 Configuration/Mission - Balloon launch

2.30.2 Task Elements - Design and fabrication of flight electronics boards and boxes.

2.30.3 Summary - Hardware delivered on time.

2.31 Ground Based Array (758) October 1985 - June 1987

2.31.1 Configuration/Mission - To adapt a spectrometer to a ground based telescope at Wyoming State University.

2.31.2 Tasks Elements - Layout the optics from a SSG design and fabricate all hardware (mirrors, benches, electronics) necessary.

2.31.2 Summary - The adaptation was successfully completed.

2.32 EXCEDE III (760) October 1985 to June 1988

2.32.1 Configuration/Mission - A 38" diameter, 5000 lb aries payload with an electron gun section and an instrument section. To be launched from the Northern Range South at WSMR.

2.32.2 Task Elements - Original task was to design and build entire instrument section with doors, drive mechanisms, skin etc. The job was later changed to the design and subcontracting of the Aries Launch Platform Shelter (ALPS).

2.32.3 Summary - Letting out subcontract for ALPS scheduled for early calendar 89. Launch scheduled for April 1990.

2.33 DIGBE (761) January 1986 - June 1988

2.33.1 Configuration/Mission - A 21" diameter Aries payload with electro mechanical devices and infrared sensors designed to study interstellar clutter with a rotating out of line of flight sensor.

2.33.2 Task Element - Refurbish the ZIP payload for use on DIGBE mission.

2.33.3 Summary - Work was halted due to funding problems. No re-schedule of launch to date.

2.34 ECHO-7 (763) January 1987 - June 1988

2.34.1 Configuration/Mission - Research payload on Terrier Black Brant Rocket, designed to inject electron beams along earth's magnetosphere and analyze their return.

2.34.2 Task Elements - Design, fabricate and integrate payload accelerator and instrumentation.

2.34.3 Summary - Payload was successfully integrated and launched February 8, 1988 from Poker Flat Research Range, Alaska.

2.35 BEAR (764) January 1987 - June 1988

2.35.1 Configuration/Mission - A 44" diameter Aries payload designed to produce neutral particle beams in space and study their interaction.

2.35.2 Task Elements - Staff personnel designed and fabricated the telemetry/physics section with blow off doors, deck, and a non conducting boom for plasma studies.

2.35.3 Summary - TM/Physics can is currently undergoing test and integration. Launch is scheduled for April 1989.

2.36 RADC (751) July 1986 - June 1988

2.36.1 Configuration/Mission - WIT is occasionally requested to support small tasks for Rome Air Development Center (RADC).

2.36.2 Task Elements - Design and/or fabrication of various electronics hardware such as PCB's.

2.36.3 Summary - Deliveries on time and satisfactory.

2.37 COLDR (768) July 1986 - June 1988

2.37.1 Configuration/Mission - To measure the conductivity of the Lower D Register with a mass spectrometer on board a Nike Orion.

2.37.2 Task Elements - Staff personnel designed, fabricated and tested the parachute recovery section, vehicle ignition system and despin system.

2.37.3 Summary - Launch & mission were successful on August 15, 1987 from Wallops Island.

2.38 Mass Spect. Syst. (771) Jan 1987 - Sept 1987

2.38.1 Configuration/Mission - Unknown

2.38.2 Task Elements - Electronic parts such as PC boards, harnesses and boxes to be fabricated.

2.38.3 Summary - Hardware was delivered.

2.39 ABLE (775) October 1987 - June 1988

2.39.1 Configuration/Mission - Balloon launch

2.39.2 Task Elements - Printed circuit boards were designed and built.

2.39.3 Summary - Hardware delivered on time.

2.40 IBSS (777) April 1987 - June 1988

2.40.1 Configuration/Mission - A shuttle borne experiment for an Infrared Background Sky Survey in conjunction with MBB.

2.40.2 Task Elements - Staff personnel designed and fabricated electronics boxes for transmitters, recorders and TV's and ground support equipment.

2.40.3 Summary - Hardware is currently in integration and test. Launch is scheduled for February 1990.

2.41 Lesser Projects

Wentworth participated in a lesser manner in some projects by supplying hardware or services to AFGL. Our effort was not enough to clarify the intent or finish of a project. Consequently, these projects are just listed below:

LASS II

BALLOON AX (726)

Main Elect. Box (733)

Data Acquisition System (747)

BERT II (A19.250-2)

SCRIBE 100 (766)

ALPHAN II (772)

XYBION VESSEL (776)

CHAMBER MODS (774)

CODES (746)

POLAR ARCS (762)

IMAGE PROCESSOR (767)

METEOR SCATT DATA (769)

CHEM MODEL (770)

GM TUBES (773)

COLDR 2 (778)

CHANGE III (779)

WENTWORTH LABS TECHNICAL STAFF

3.0 The value of experience should not be undervalued when rating an organization's capability to provide quality aerospace hardware and services at cost effective rates. The following individuals contributed to the projects as outlined in this report.

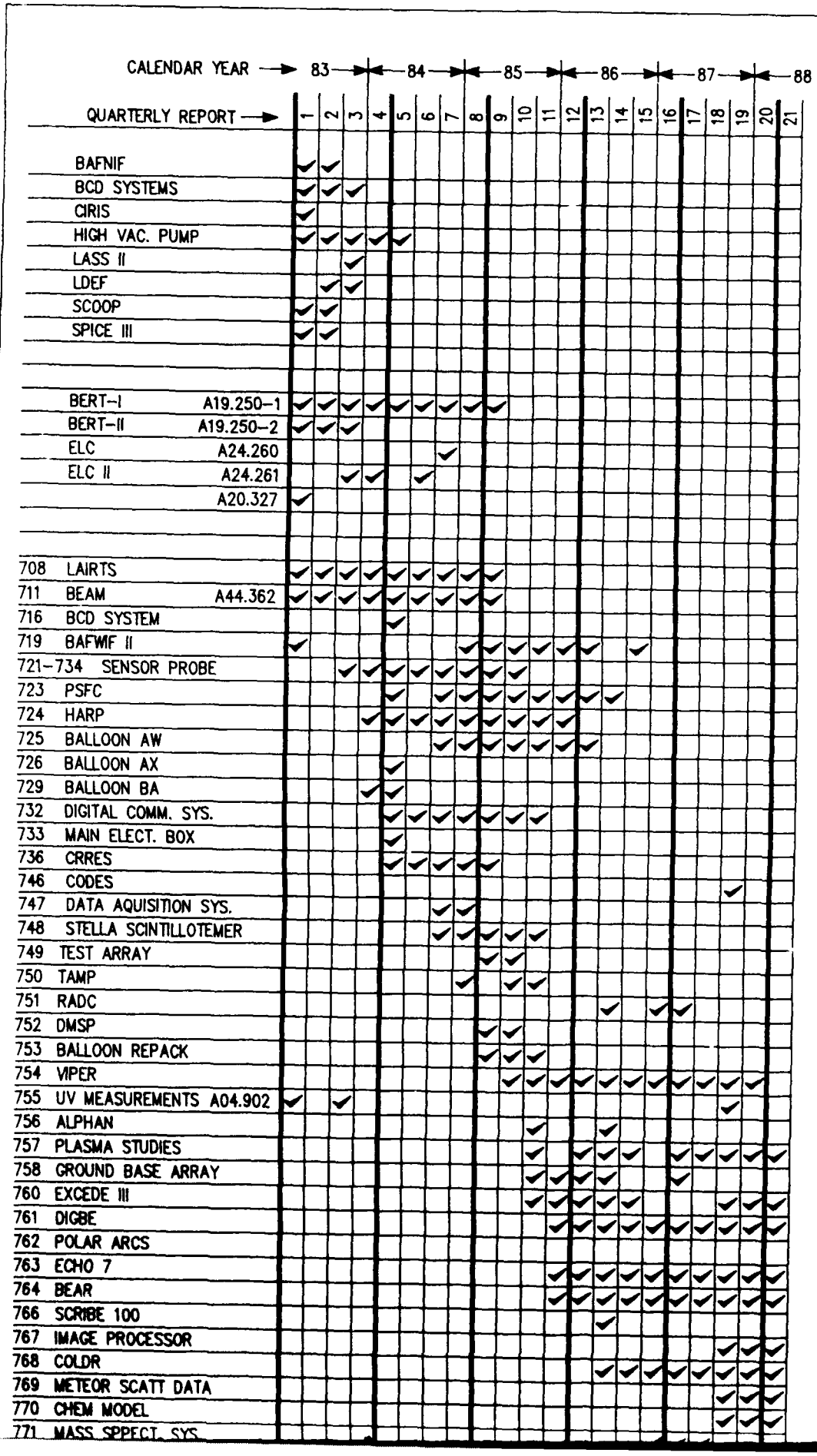
*Currently Active at WIT

Name	Title	Yrs at WIT on Research Contracts	Total Research Exp. - years	Education
*Benassi, Howard	Spvr. Instrumentation	30	30	AS
Cabral, Rudolph	Instrument Maker	12	23	Cert.
*Fritzler, Frederic	Alternate Supervisor	36	36	Cert.
*Gambale, Alfonso	Instrument Maker	15	27	Cert.
*Larson, Jon	Machinist III	3	3	BS
*Molter, Otto	Master Model Maker	18	19	Cert
Ortendahl, Walter	Master Machinist	21	30	Cert.
Charron, Robert	Spvr. Electronics	24	24	AS
*Campbell, Thomas	Electrical Engineer V	21	21	BS
*Cutter, George	Alternate Supervisor	28	28	BS
Baratz, Milton	Elec Eng Tecjmocoam IV	20	20	Cert.
*DiMilla, Thomas	Elec Eng Technologist V	32	32	AS
LeBeau, Michael	Elec Eng Technician II	3	3	AS
Masse, William	Elec Eng Technician IV	5	5	AS
*Mundis, Paul	Elec Eng Technician V	23	40	AS
*Nardella, Daniel	Elec Eng Technologist V	28	28	AS
*Rodrigues, Timothy	Electrical Engineer	3	3	BS
*Smart, Lawrence	Elec Eng Technician V	21	21	Cert.
Stromberg, Gustave	Elec Eng Technician V	18	30	AS

*LeBlanc, Edgar	Spvr. Mechanical	37	37	Cert.
Cleveland, Frank	Mech. Tech. IV	35	35	Cert.
*Hartnett, Paul	Alternate Supervisor	28	28	AS
*Hurley, Patrick	Mech Eng Designer V	9	28	AS
*Lund, Ray	Mech Eng Designer V	6	25	AS
Williams, Edward	Mech Equipment Specialist	5	5	AS
*Gates, Richard	P.I./Mechanical Engineer	3	19	BS

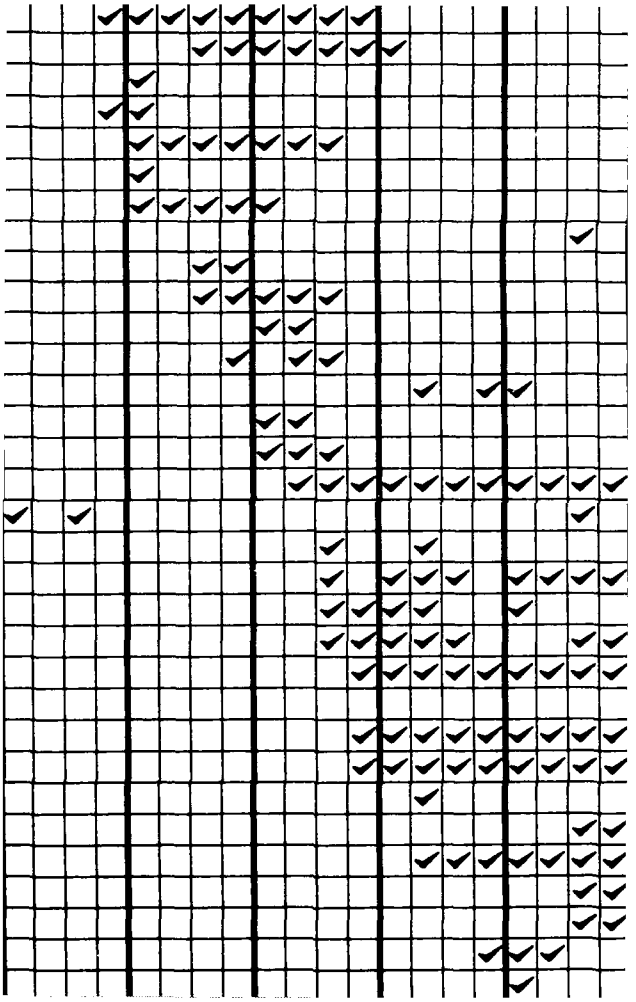
4.0 Activities by Quarter

Specific progress on individual tasks inside the projects outlined here is detailed in the Quarterly Reports submitted over the life of the contract. As a reference guide, the following chart is provided to allow easy access to those tasks by charting activity by quarter.



Activities
Under
F19628-83-C-0014
by Quarter

ACTIV1.DWG

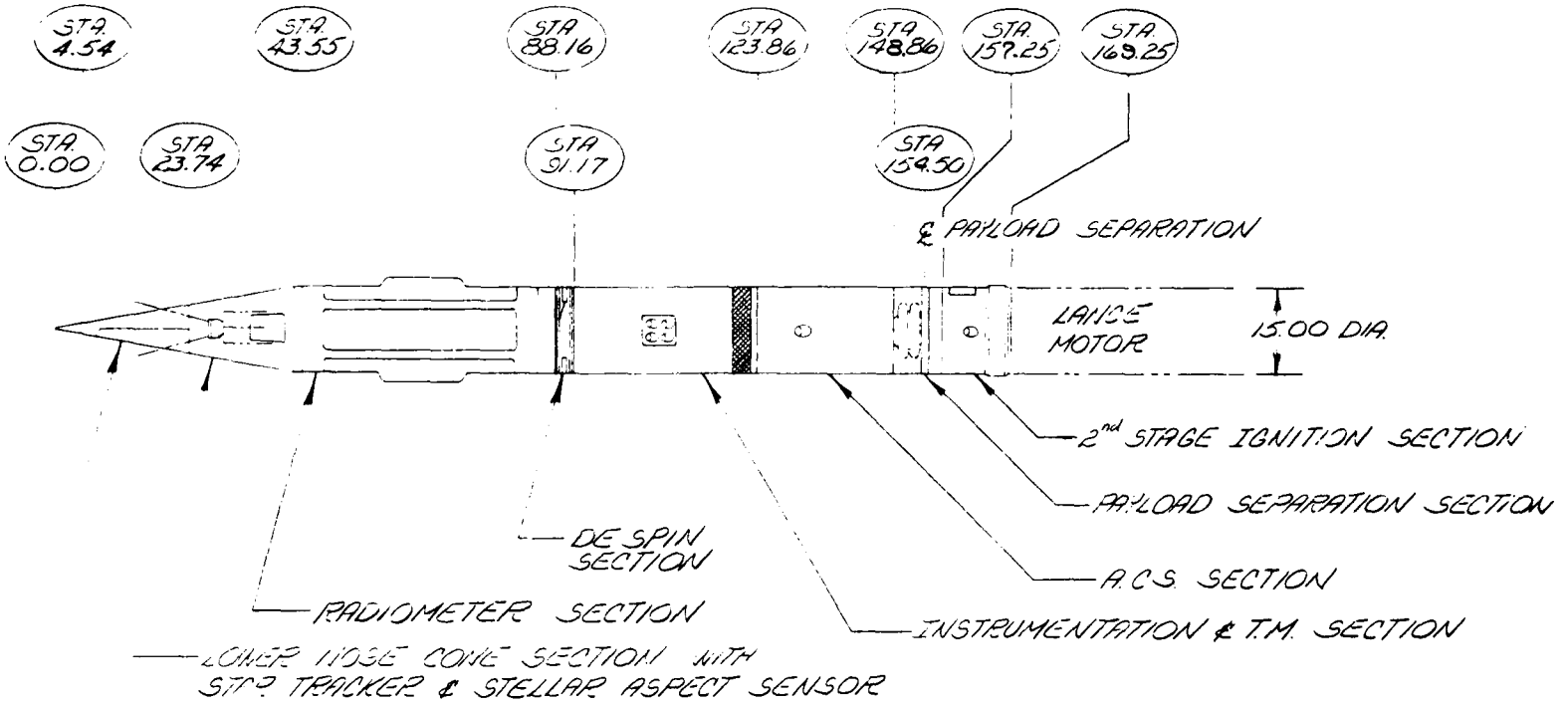


5.0 Selected Project Drawings

Contained in this section is a sampling of the engineering drawings produced during Contract F19628-83-C-0014.

B-11926

REVISIONS			
SYMBOL	DESCRIPTION	DATE	APPROVAL



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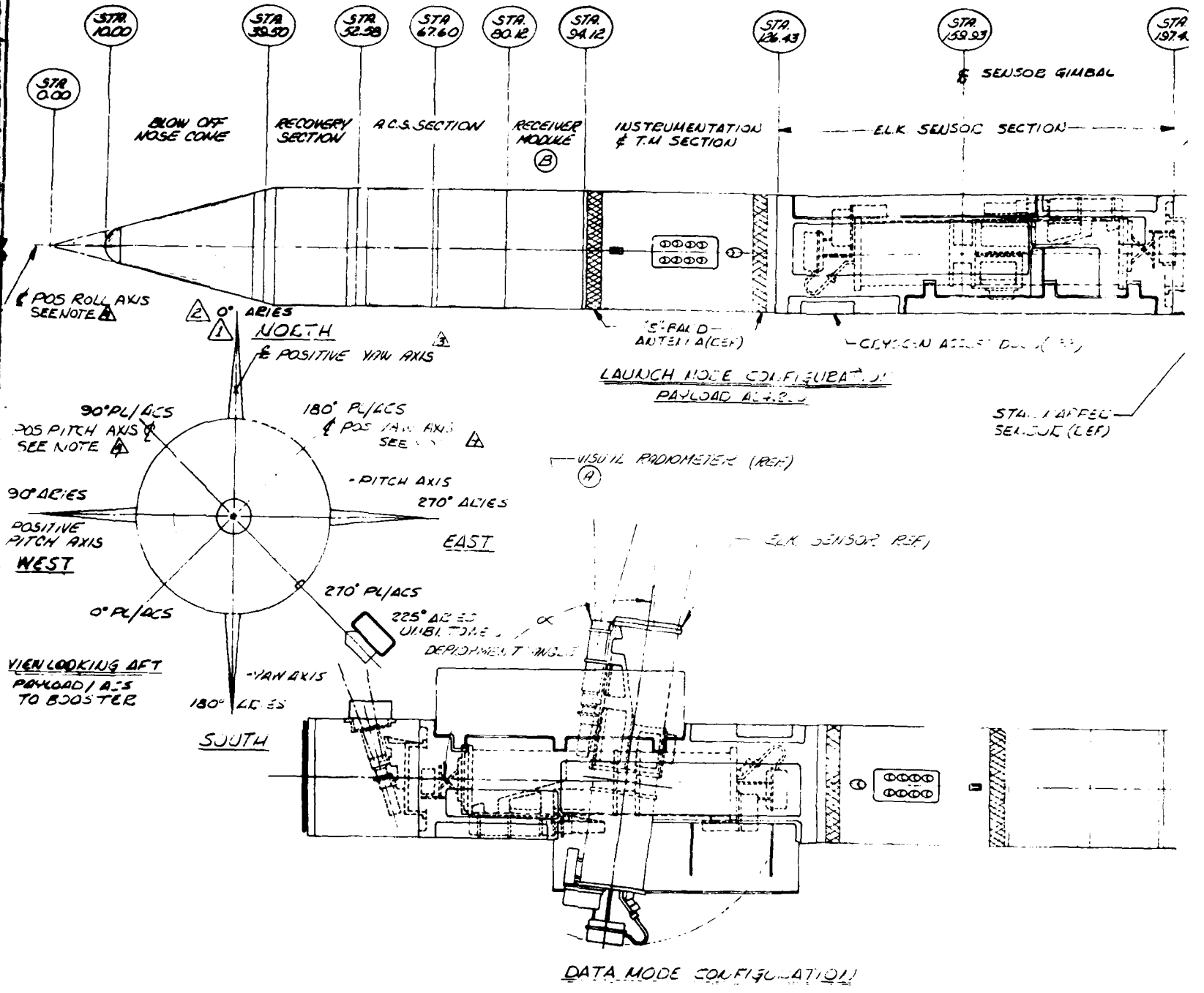
	DRAWN P HARTNETT	NEXT ASS'Y	PROJECT B.E.A.M. A44 362
	CHECKED	B.E.A.M. PAYLOAD CONFIGURATION	AEROSPACE INSTRUMENTATION DIVISION AIR FORCE GEOPHYSICS LABORATORY HANSCOM AFB, MA 01731
TOLERANCE UNLESS OTHERWISE NOTED DECIMAL: XX ± .02, XXX ± .005 SURFACE FINISH: 125 ANGULAR: ± 0°30' BREAK SHARP EDGES AND DEBURR	SCALE 1/20	SHEET 1 OF 2	B-11926 REV
	MATERIAL		

MASSPACE P.3031



AXES DEFINITION FOR SEPARATED PAYLOAD

AXES DEFINITION FOR BCS ONLY

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NUMERICAL ANGULAR LOCATIONS FOLLOWS SPACE VECTOR NOMENCLATURE.

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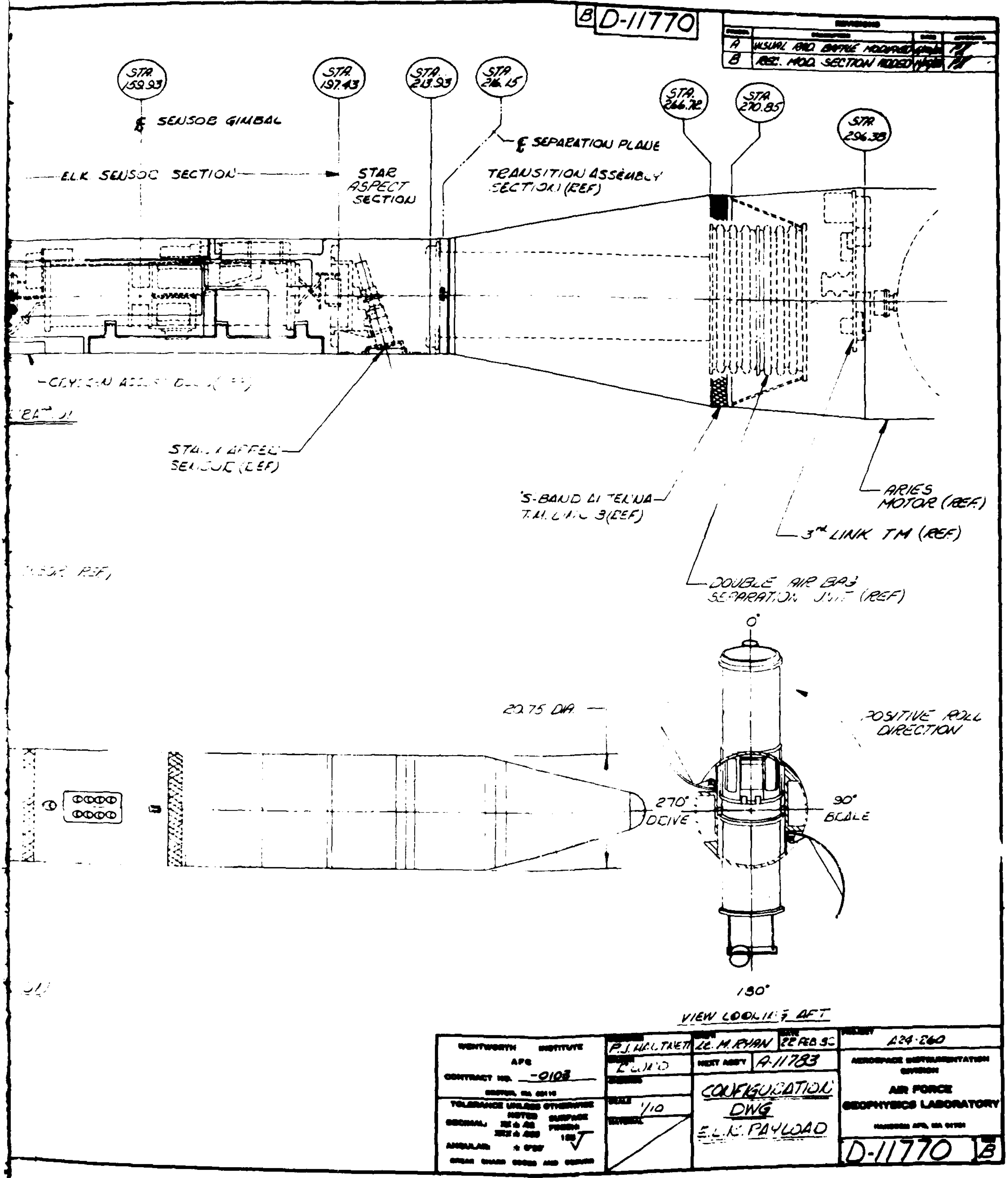
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℄ SEPARATION PLANE
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STAR ASPECT SECTION
TRANSITION ASSEMBLY SECTION (REF)
S-BAND ANTENNA T.M. LINK 3 (REF)
ARIES MOTOR (REF)
3rd LINK TM (REF)
DOUBLE AIR BAG SEPARATION UNIT (REF)
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0°
POSITIVE ROLL DIRECTION
270° DRIVE
90° BRAKE
180°
VIEW LOOKING AFT
WENTWORTH INSTITUTE
AIR FORCE GEOPHYSICS LABORATORY
P.J. HALLTNETT
Lt. M. RYAN
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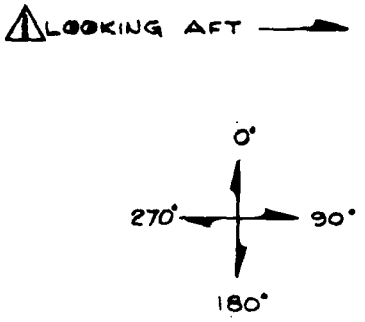
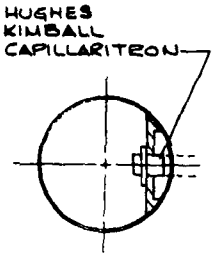
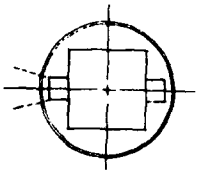
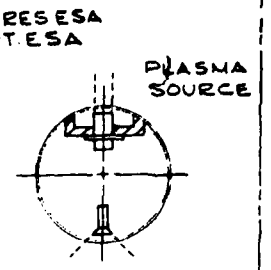


ORIENTATION

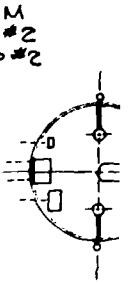


ELECTRON GUNS

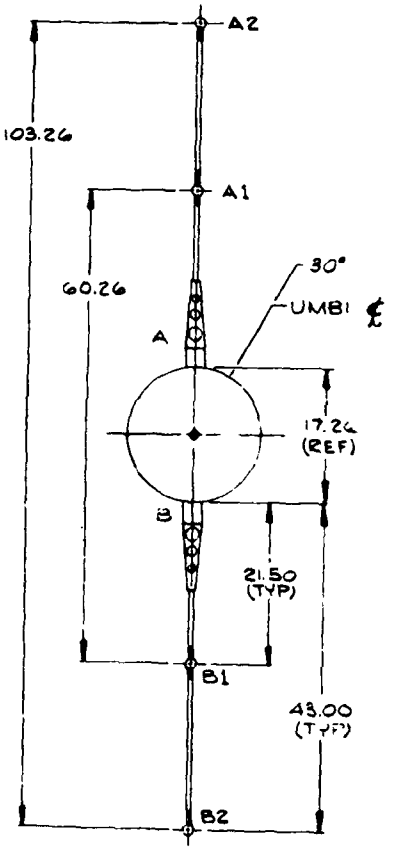

MASS SPEC

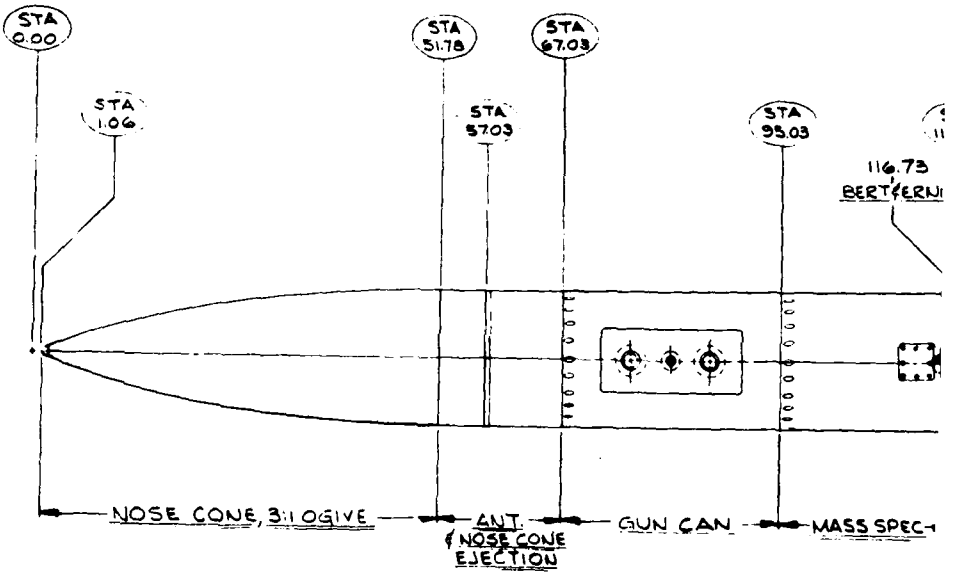


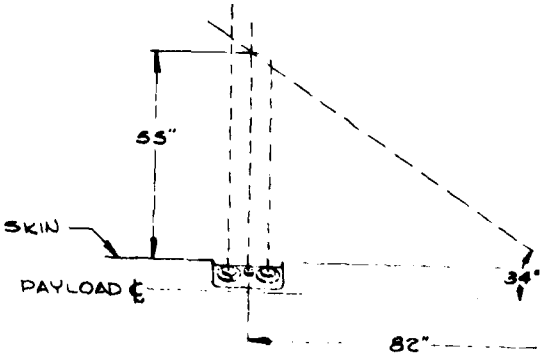
SAADS Ⓐ



SUPP







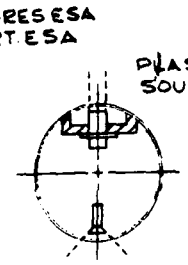
CAMERA-GUN GEOMETR

2. ⌖ DENOTES EST. C.G.
1. TORQUE TENSION JOINTS @ 57[illegible]-lbs

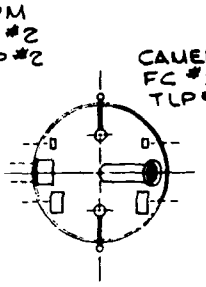
NOTES

B D-12124

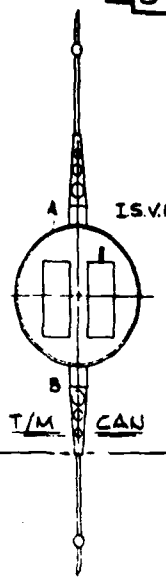
-	PRELIMINARY RELEASE	[illegible]	
A	GENERAL UPDATE	WLP	
B	WEIGHTS UPDATE RELEASE FOR FLIGHT	5/31/94	



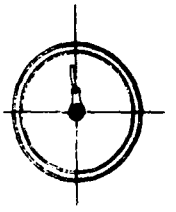
SAADS (A)



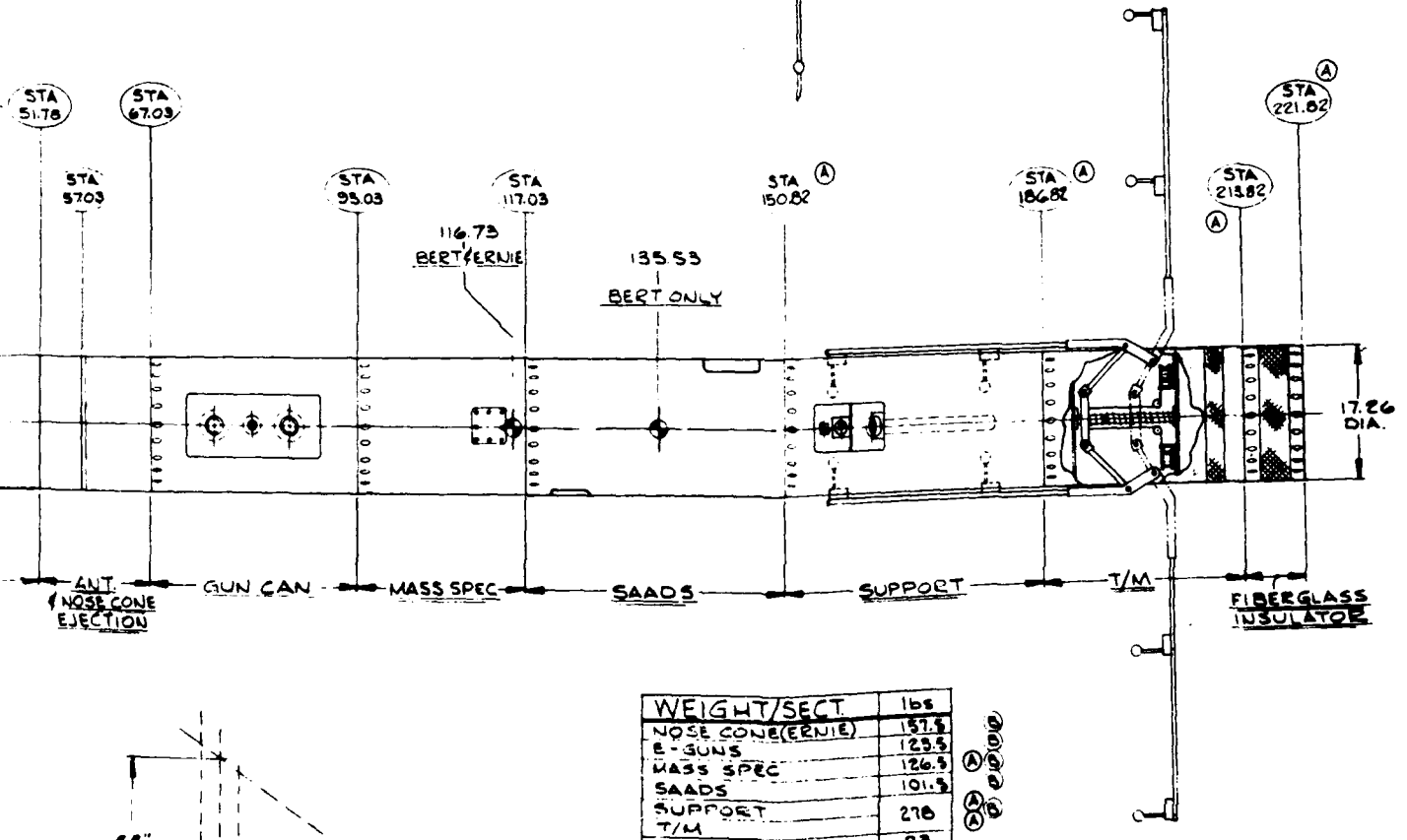
SUPPORT



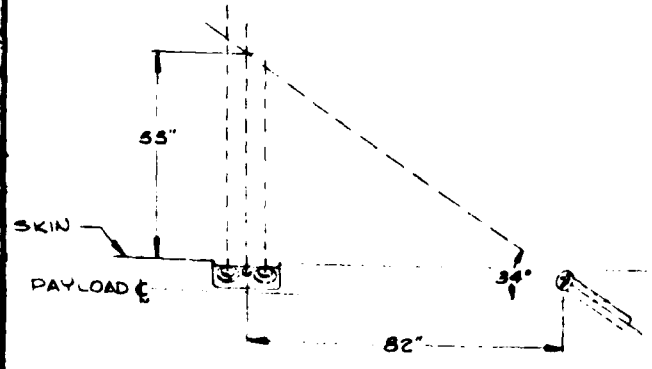
T/M CAN



FIBERGLASS INSULATOR

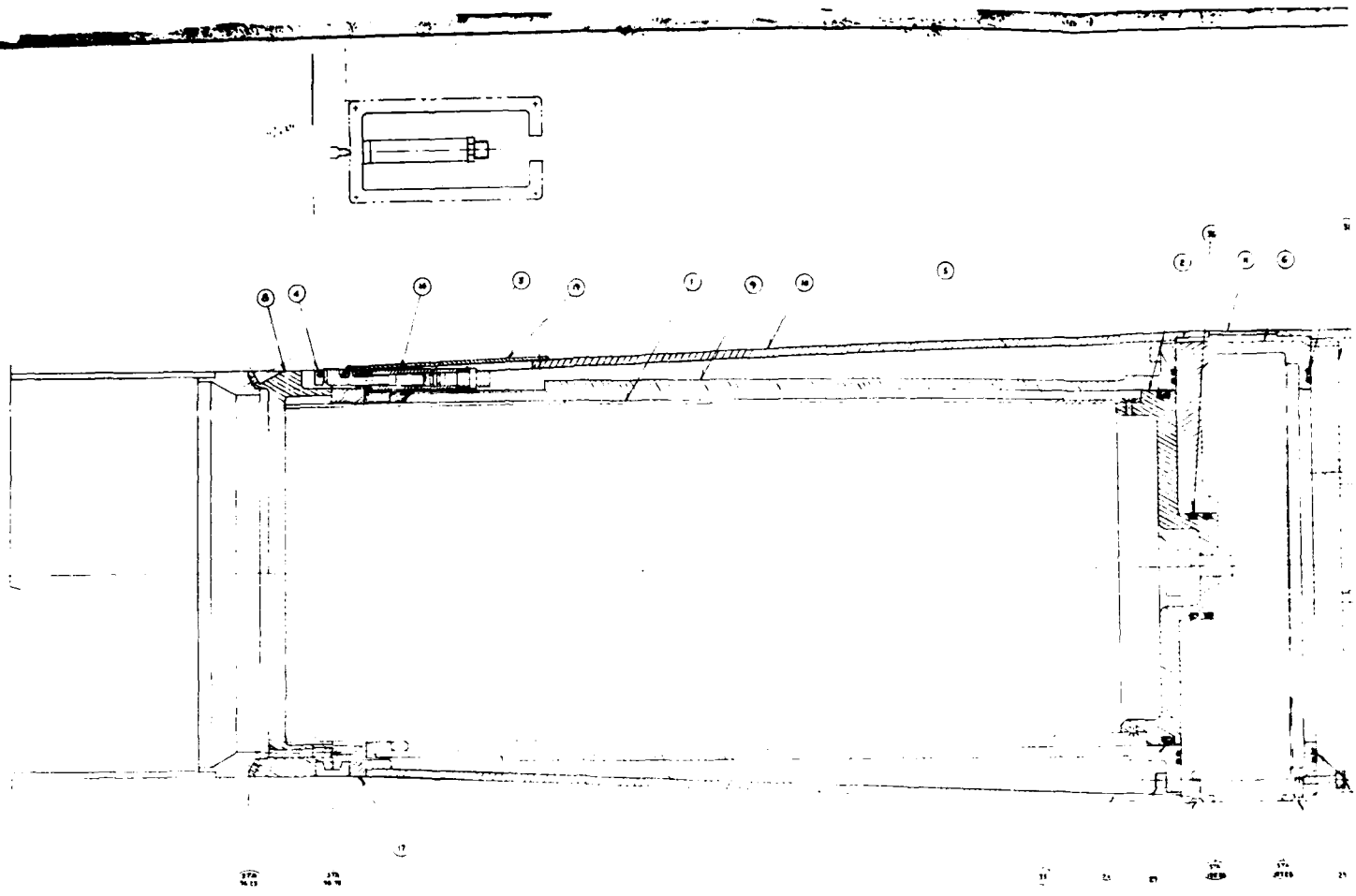


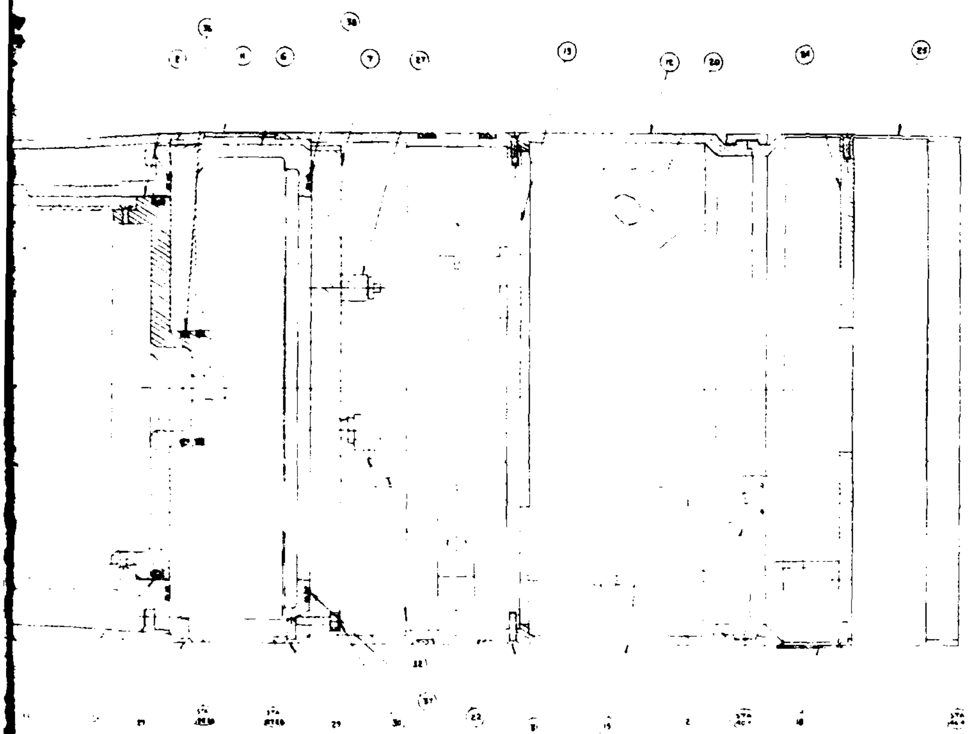
WEIGHT/SECT	lbs	
NOSE CONE(ERNIE)	157.5	B
E-GUNS	129.5	
MASS SPEC	126.5	A B
SAADS	101.5	
SUPPORT	278	A B
T/M		A
F/G INSULATOR	23	
IGNITER HSNG	70	B
FLIGHT SAFETY DEST.		
	880	TOTAL A B



CAMERA-GUN GEOMETRY

APS CONTRACT NO. -0014	E.LUND	W.LYNCH MAR 94	BERT 1 A19.250
	E.LUND		AIR FORCE GEOPHYSICS LABORATORY
	1/10	CONFIGURATION DWG BERT 1 PAYLOAD	D-12124 B



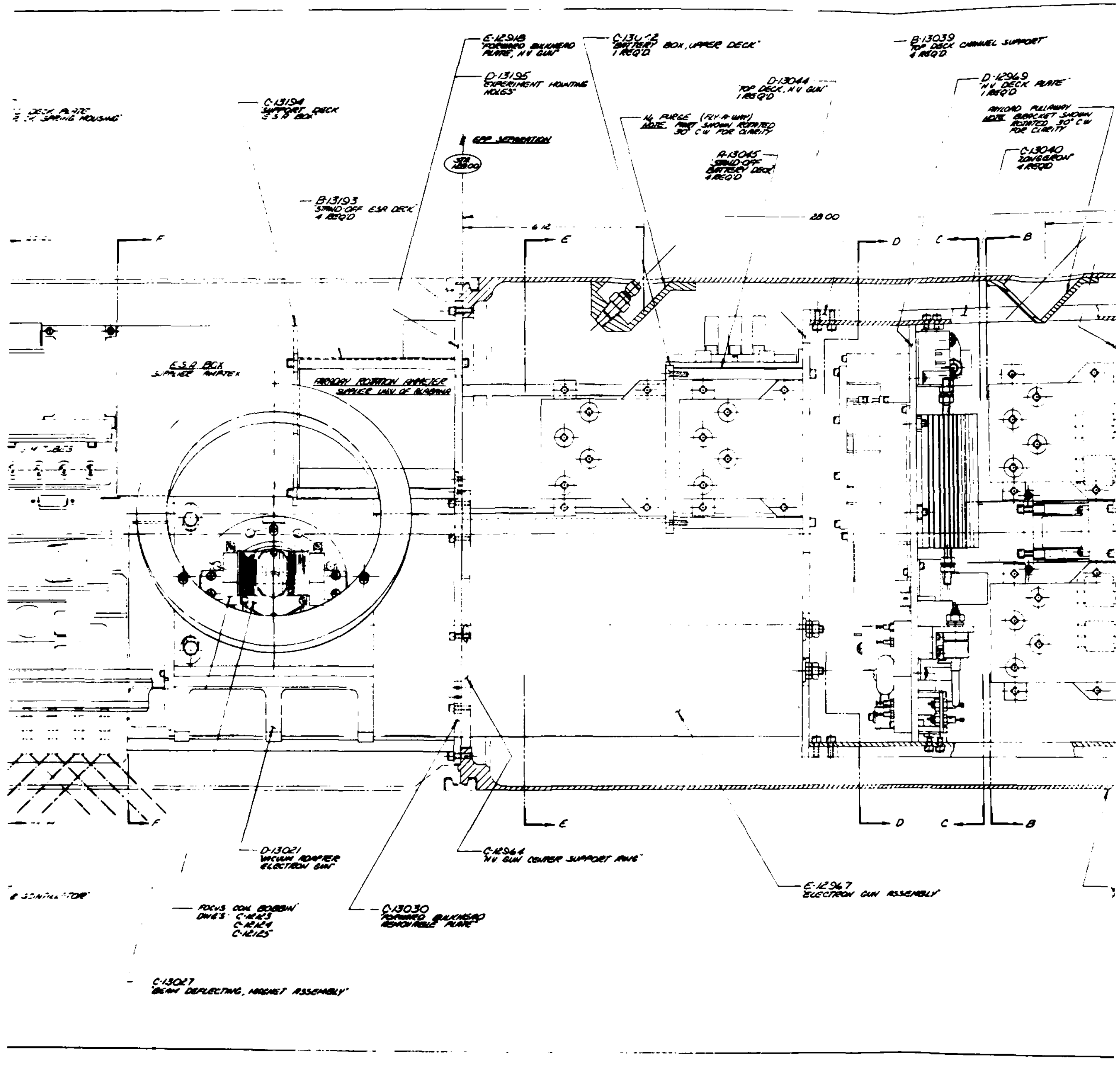


WEIGHTS (POUNDS)		
RECOVERY SYSTEM	246.0	INCLUDES 107 # LEAD [illegible]
PARACHUTE	21	
PAYLOAD	228.0	INCLUDES ADAPTER RING
TOTAL	[illegible]	

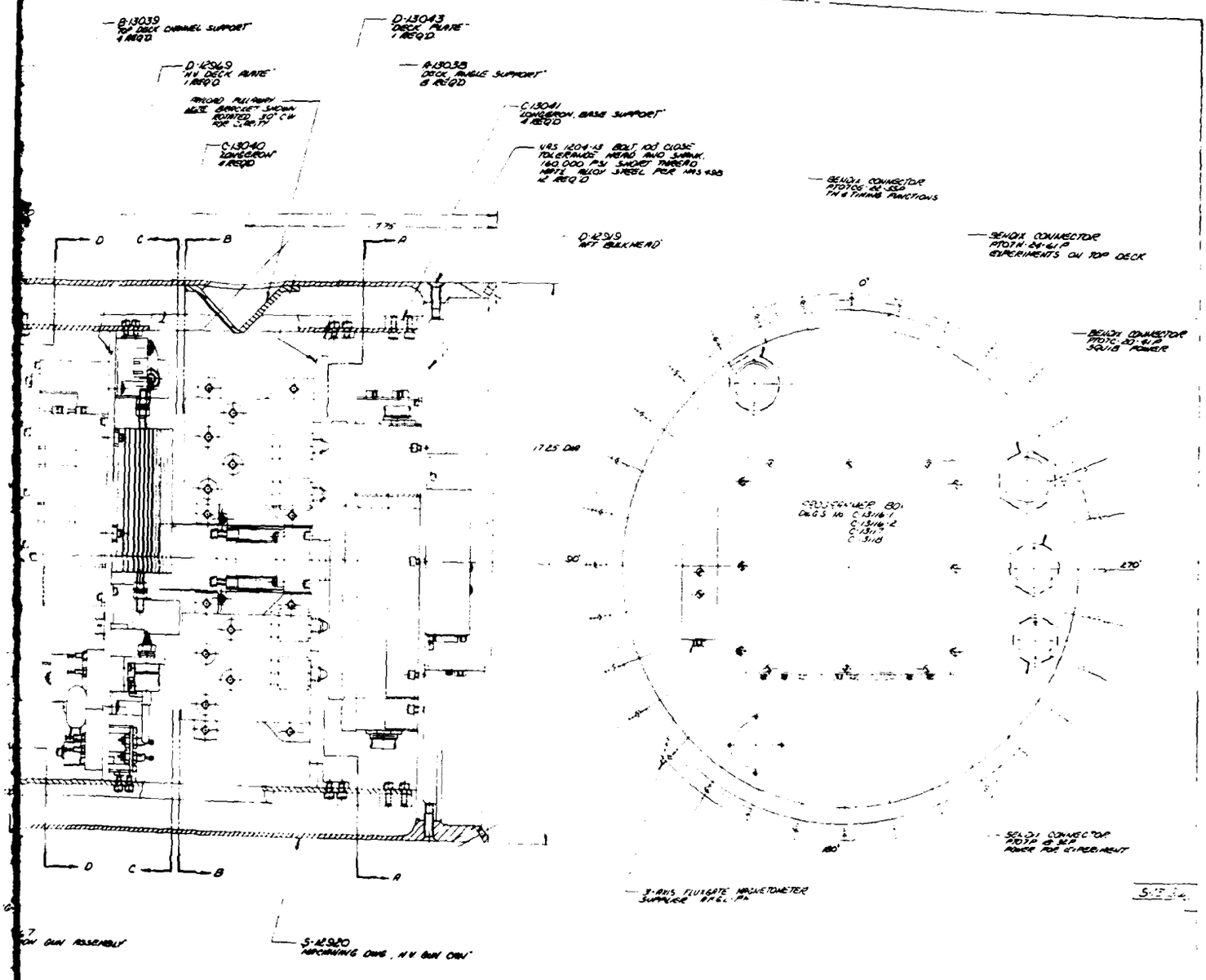
ITEM	PART NO	QTY	DESCRIPTION	
38	2 177	1	O RING PARKER COMPOUND S604-70	
37	2 276	1	O RING PARKER COMPOUND S604-70	
36	2 [illegible]	2	O RING PARKER COMPOUND S604-70	
35	2 449	1	O RING PARKER COMPOUND S604-70	
34				
33				
32	738	1	SHOCK ABSORBER [illegible]	
31		12	FLAT HD SOC CAP SCREW 82° [illegible]	
30		24	SOC HD CAP SCREW [illegible]	
29		24	FLAT HD SOC CAP SCREW 82° [illegible]	
28		12	SOC HD CAP SCREW [illegible]	
27	[illegible]	1	PRESSURE TRANSDUCER [illegible]	
26				
25			IGNITION SHELL	
24		1	IGNITION DECK	
23				
22	D-13183	1	FILL DOOR	
21	B-13 [illegible]	1	ANCHOR NUT [illegible] BAND	
20	C-10557	1	BRACKET [illegible]	
19	C-13098	1	COVER, TRANSITION SECTION	
18	B-13139	1	DOOR IGNITION [illegible]	
17	E-13072		RING OUTER [illegible]	
16	D-13051		DESPIN ASSEMBLY	
15	C-13128	1	ARMING CONNECTOR / & SWITCH DOOR	
14	C-13127		[illegible]	
13	E-13144	1	DESPIN/ELECTRONICS DECK	
12	E-13127	1	DESPIN/SEPARATION SECTION	
11	B-13145	1	PROTECTIVE COVER PRESSURE [illegible]	
10	S-13047	1	[illegible]	
9	S-13086	1	CYLINDER, PARACHUTE CAN	
8	E-13077		[illegible] RING	
7	C-13077	1	COVER PLATE [illegible]	
6	E-2152		PRESSURE [illegible]	
5	D-13054	1	PARACHUTE [illegible]	
4	D-13010-4	1	"V" BAND ASSY	
3	D-13012-3	1	[illegible]	
2	D-13012-2	1	PISTON	
1	D-13012-1	1	PARACHUTE CAN	

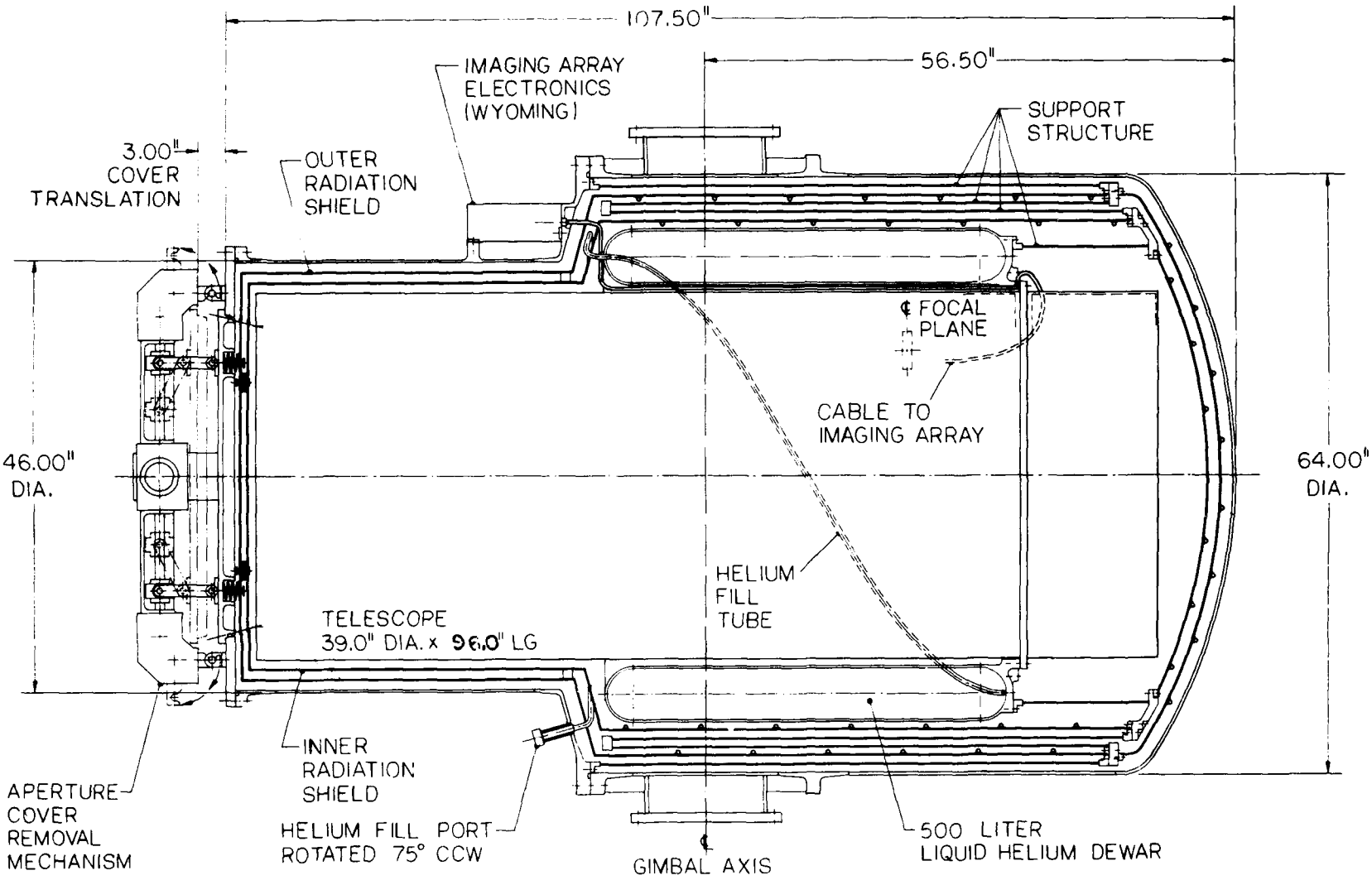
LAYOUT
PARACHUTE
RECOVERY
SYSTEM

S-13122

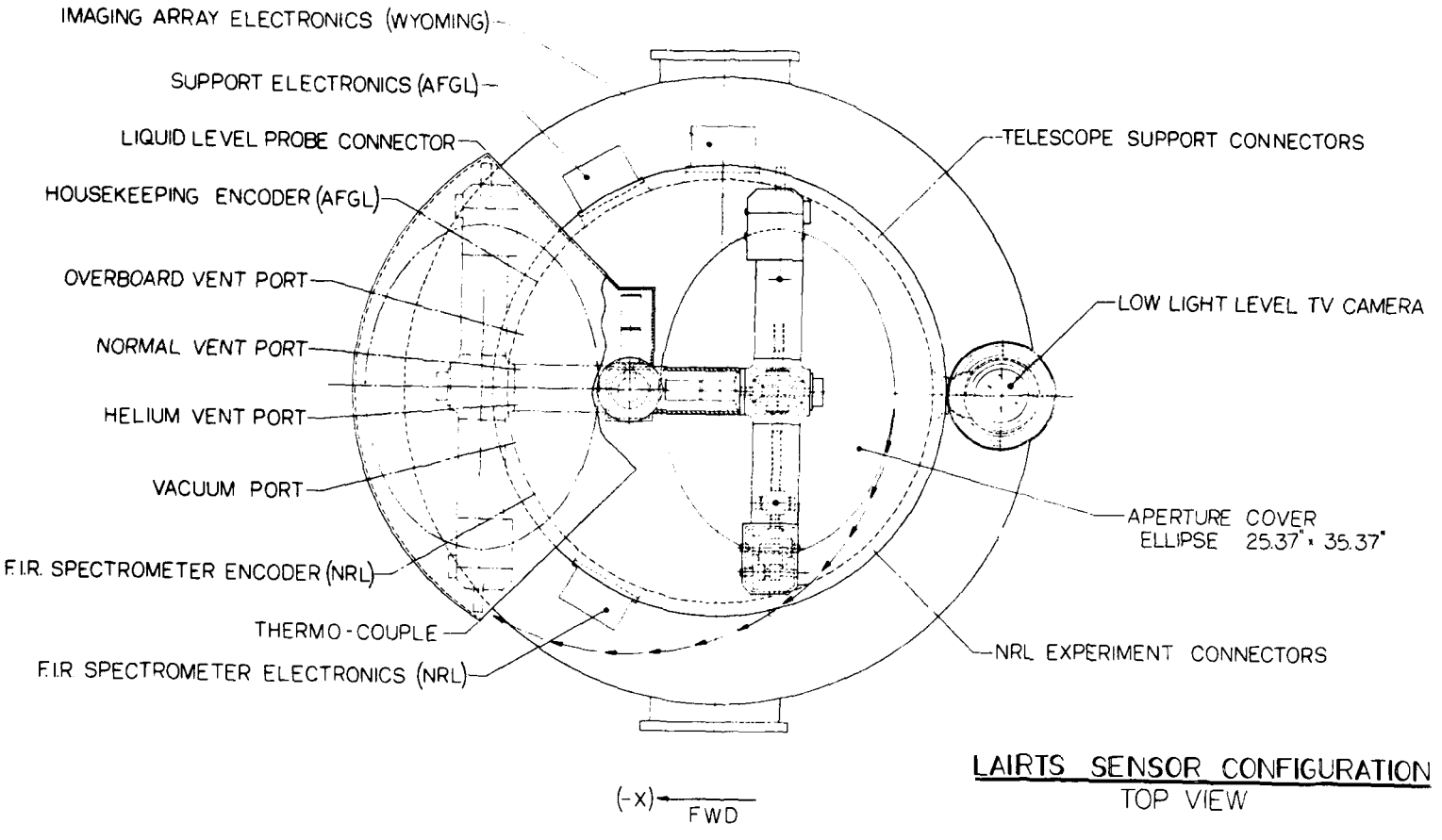


E-12918 "FORWARD BULKHEAD PLATE, H V GUN"
"BATTERY BOX, UPPER DECK" 1 REQ'D
B-13039 TOP DECK CHANNEL SUPPORT 4 REQ'D
D-13195 EXPERIMENT MOUNTING HOLES
D-13044 "TOP DECK, H V GUN" 1 REQ'D
D-12969 "H V DECK PLATE" 1 REQ'D
C-13194 SUPPORT DECK E S A BOX
N2 PURGE (FLY-A-WAY) NOTE: PART SHOWN ROTATED 30° C W FOR CLARITY
PAYLOAD PULLAWAY NOTE: BRACKET SHOWN ROTATED 30° C W FOR CLARITY
EPP SEPARATION
A-13045 STAND-OFF BATTERY DECK 4 REQ'D
C-13040 LONGERON 4 REQ'D
B-13193 STAND-OFF ESA DECK 4 REQ'D
6.12
28.00
E.S.A. BOX SUPPLIED AMPTEK
D-13021 VACUUM ADAPTER ELECTRON GUN
C-12964 "H V GUN CENTER SUPPORT RING"
E-12967 "ELECTRON GUN ASSEMBLY"
FOCUS COIL BOBBIN DWG'S C-12123 C-12124 C-12125
C-13030 "FORWARD BULKHEAD REMOVABLE PLATE"
C-13027 "BEAM DEFLECTING, MAGNET ASSEMBLY"

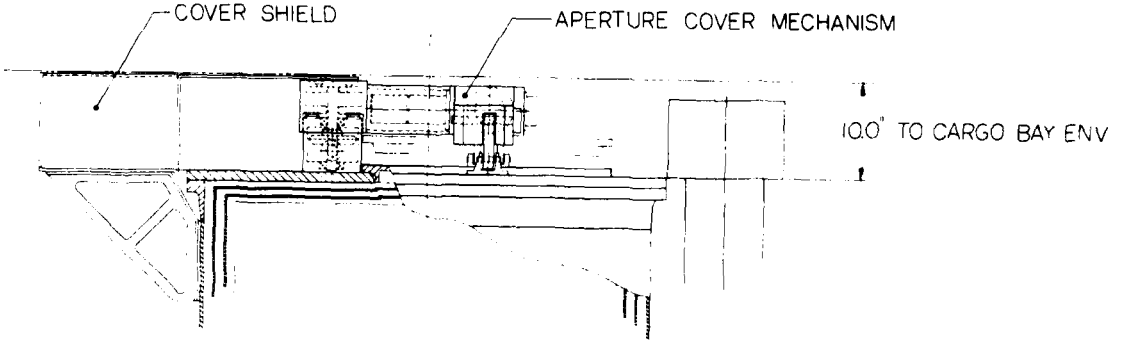

B-13039
TOP DECK CHANNEL SUPPORT
4 REQD
D-13043
DECK PLATE
1 REQD
D-12949
H.V. DECK PLATE
1 REQD
B-13038
DECK ANGLE SUPPORT
8 REQD
C-13041
LONGERON, BASE SUPPORT
4 REQD
C-13040
LONGERON
4 REQD
D-12949
WT BULKHEAD
SENSOX CONNECTOR
SENSOX CONNECTOR
SENSOX CONNECTOR
1725 DIA
0°
90°
180°
270°
3-AXIS FLUXGATE MAGNETOMETER
S-12920

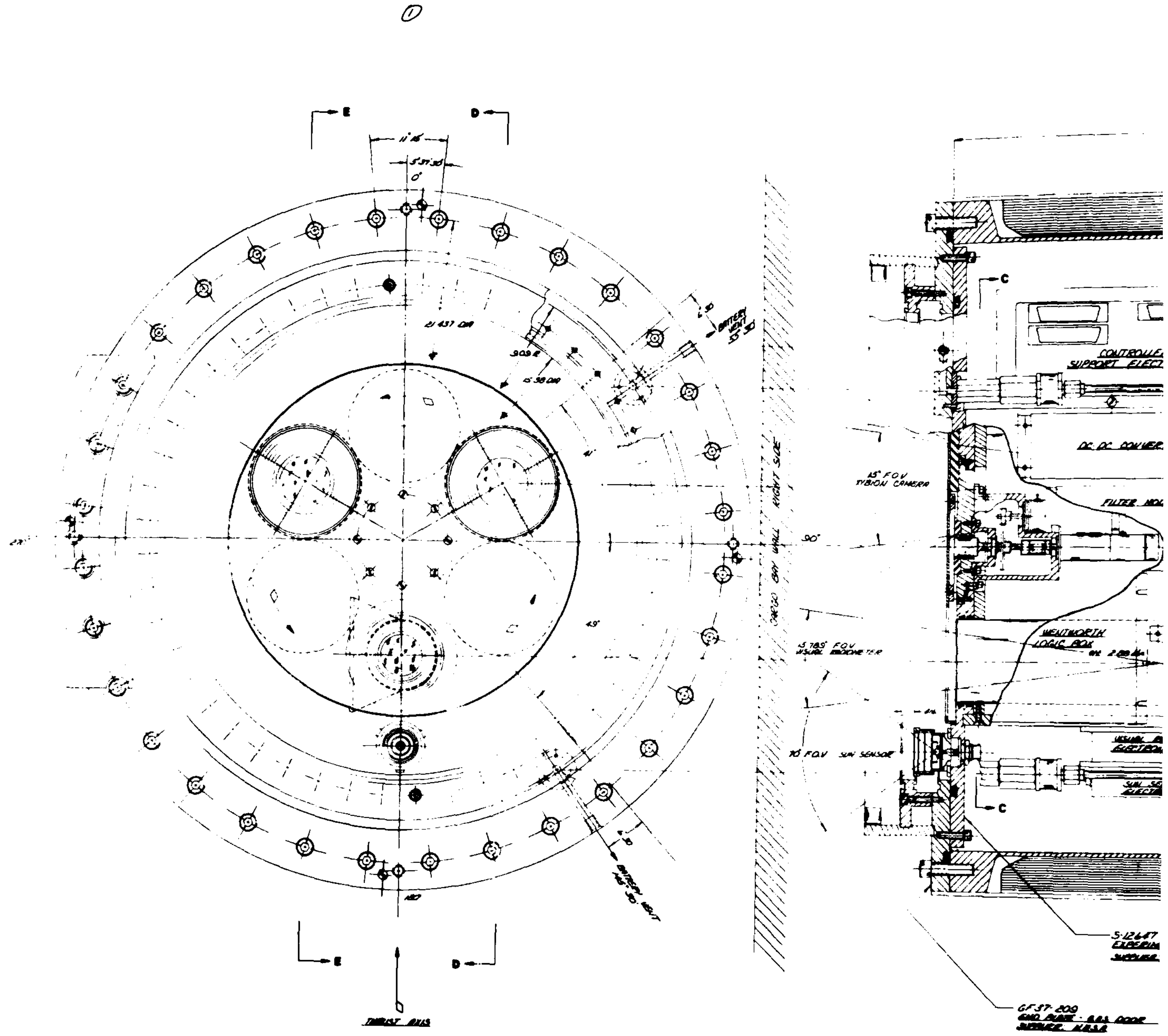


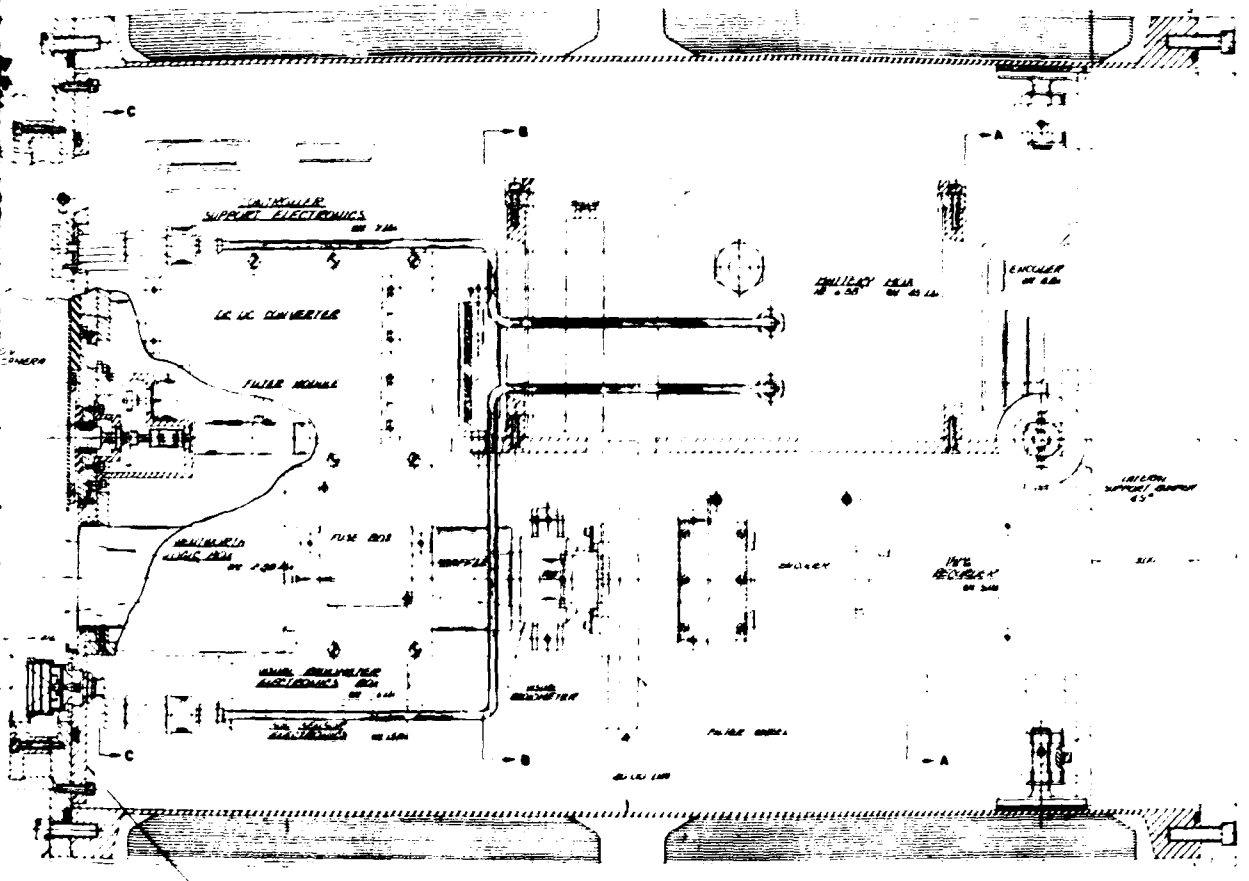
LAIRTS SENSOR - CUTAWAY CONFIGURATION



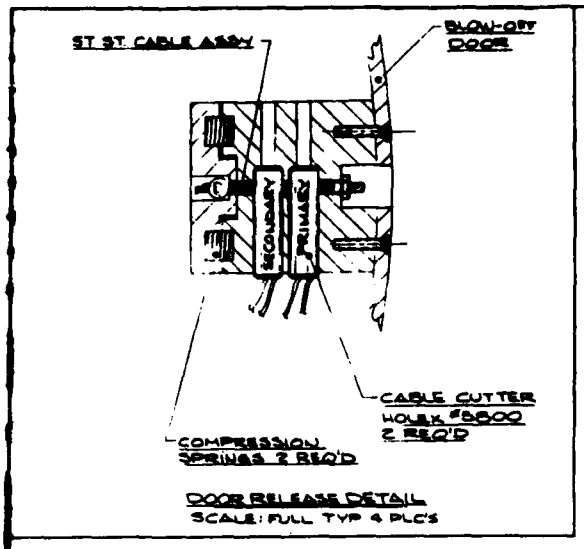
LAIRTS SENSOR CONFIGURATION
TOP VIEW



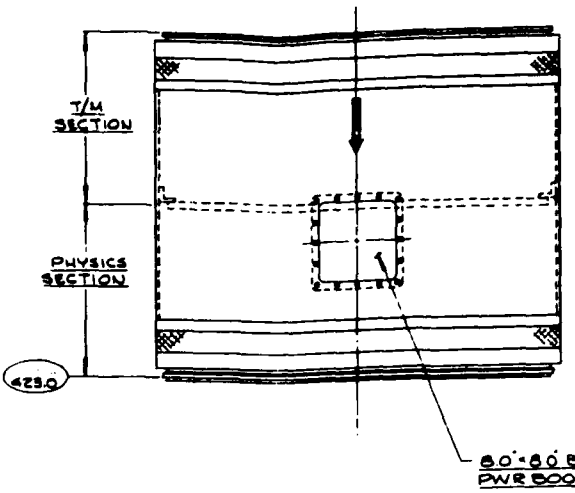

E
D
21.437 DIA
15.38 DIA
BATTERY VENT
CARGO BAY WALL RIGHT SIDE
90°
45°
180
THRUST AXIS
WENTWORTH LOGIC BOX
C
SUN SENSOR
GF 37-209


CONTROLLER
SUPPORT ELECTRONICS
LC LC CONVERTER
FILTER MODULE
FUSE BOX
PWR
RECEPTACLE

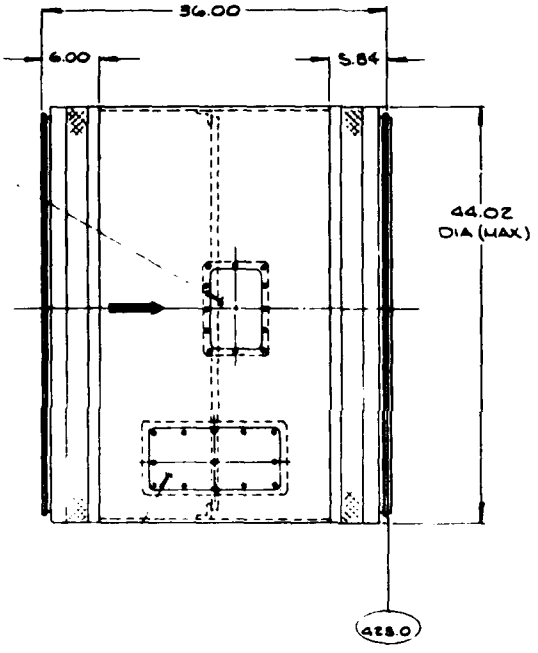
SECTION B-B

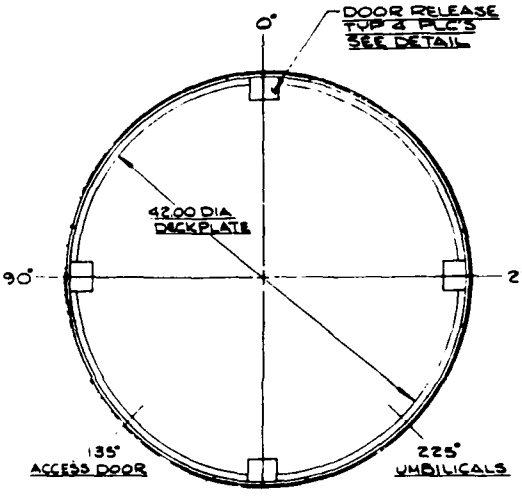


DOOR RELEASE DETAIL
SCALE: FULL TYP 4 PLC'S



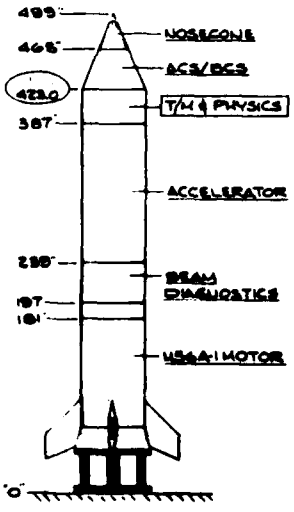
10.0'-5.0' BLOW-OFF DOOR
ESA EXPERIMENT





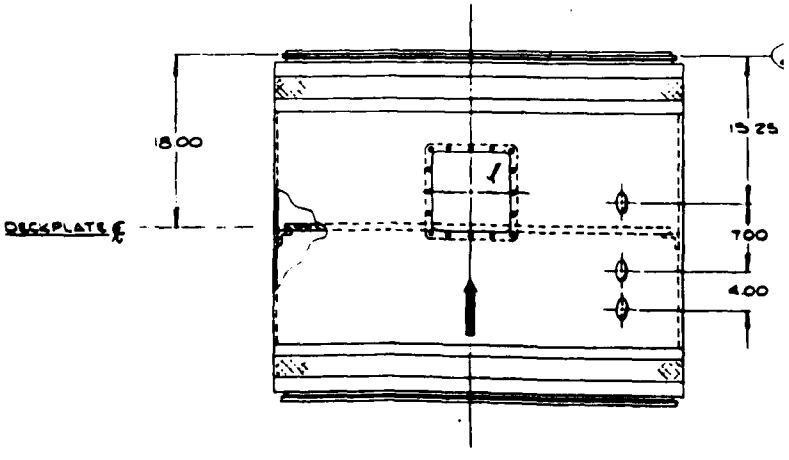
A-A
VIEW LOOKING AFT

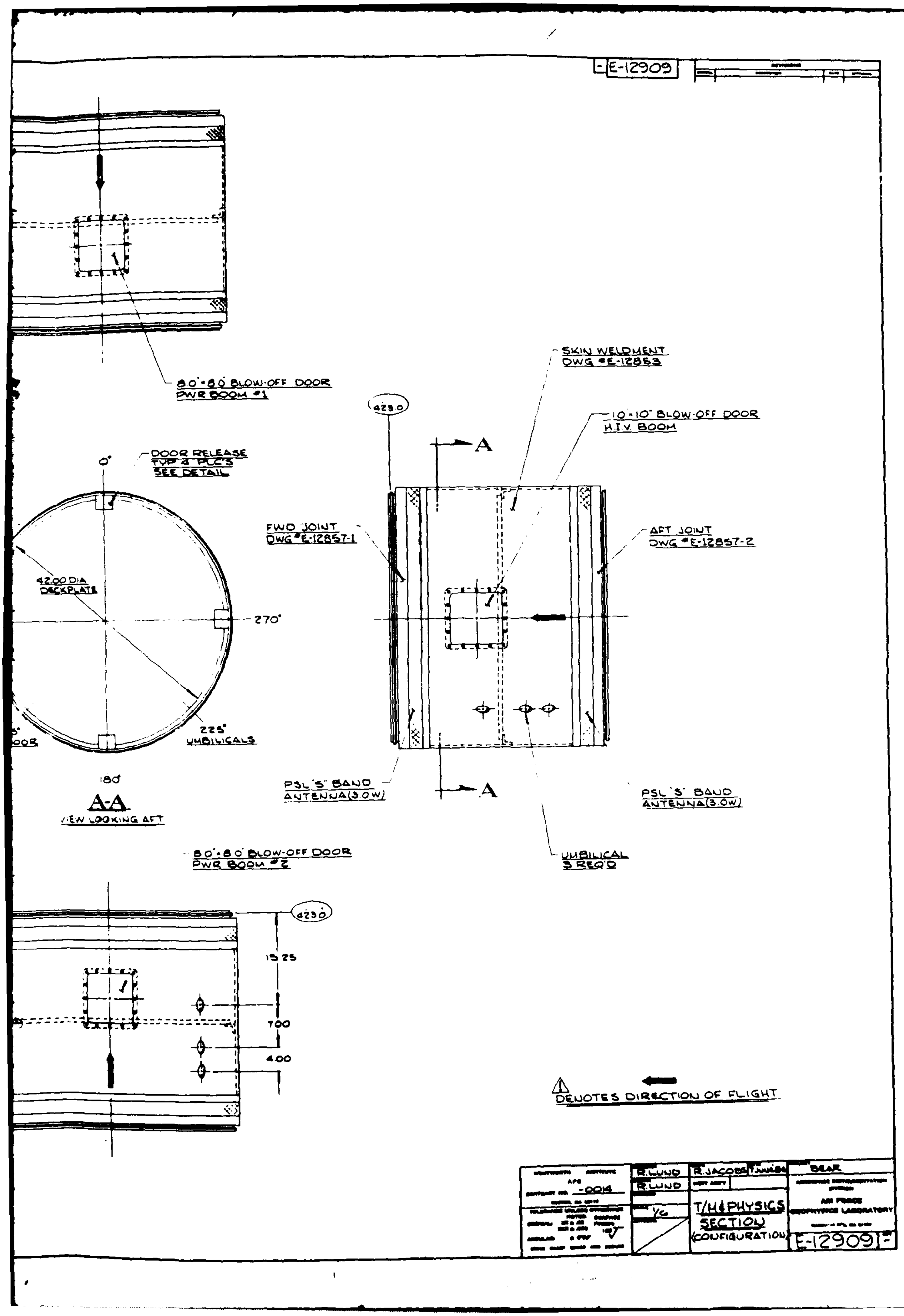
ACCESS DOOR (9.0'-14.0')

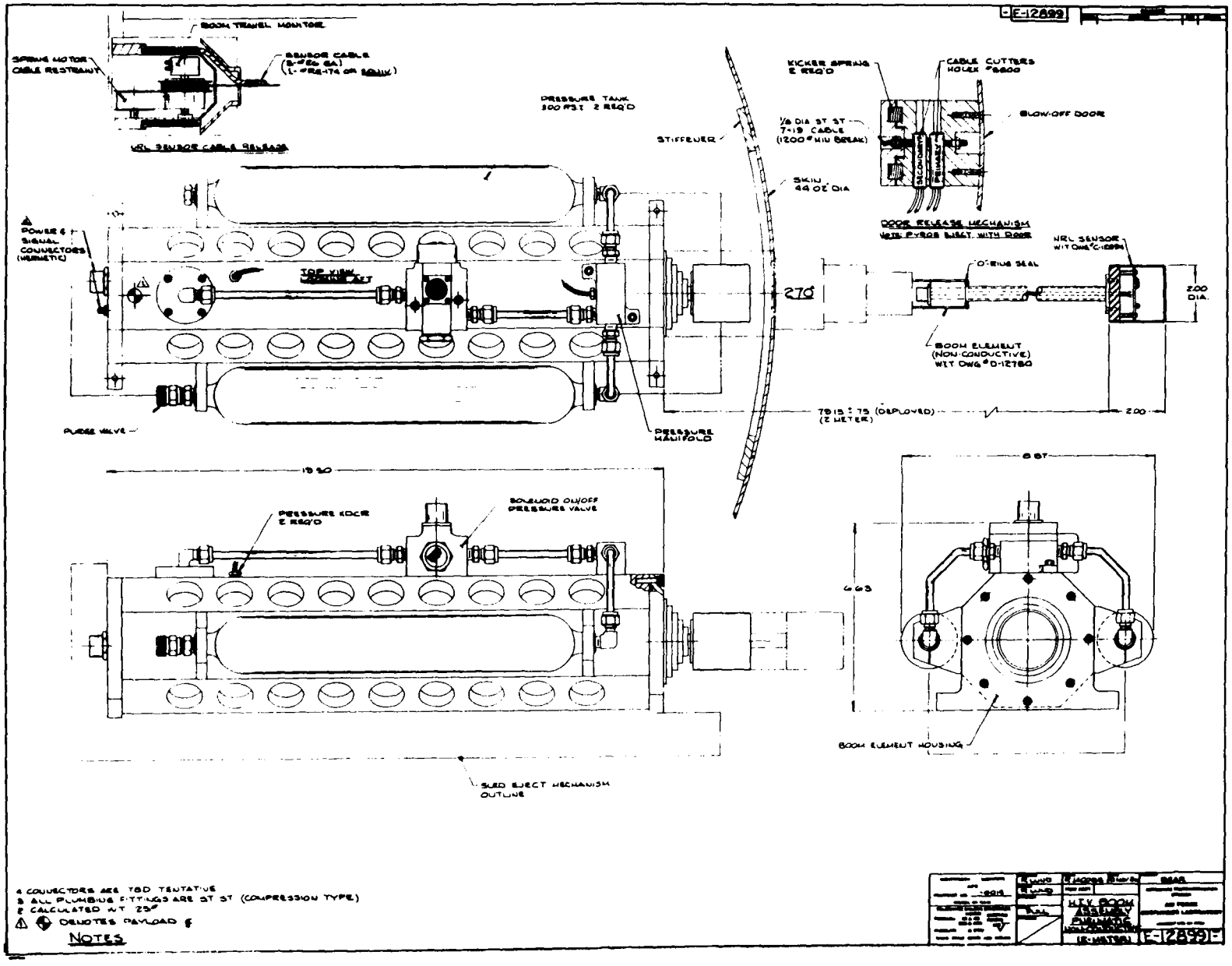


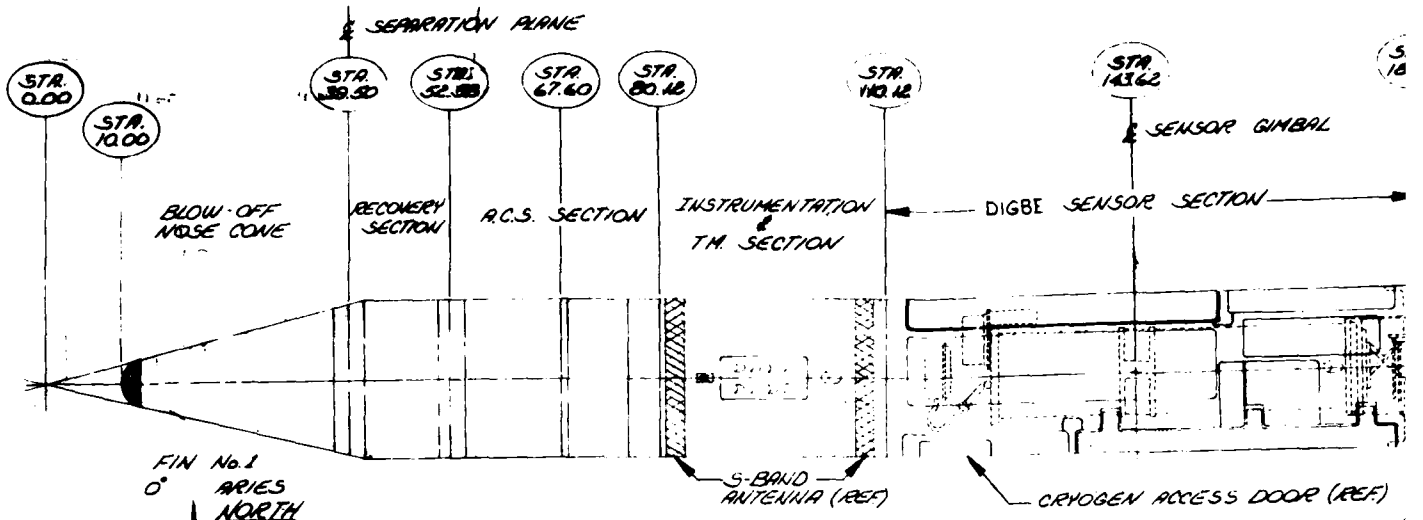
BEAM 1 CONFIGURATION

8.0'-8.0' BLOW-OF
PWR BOOM #2



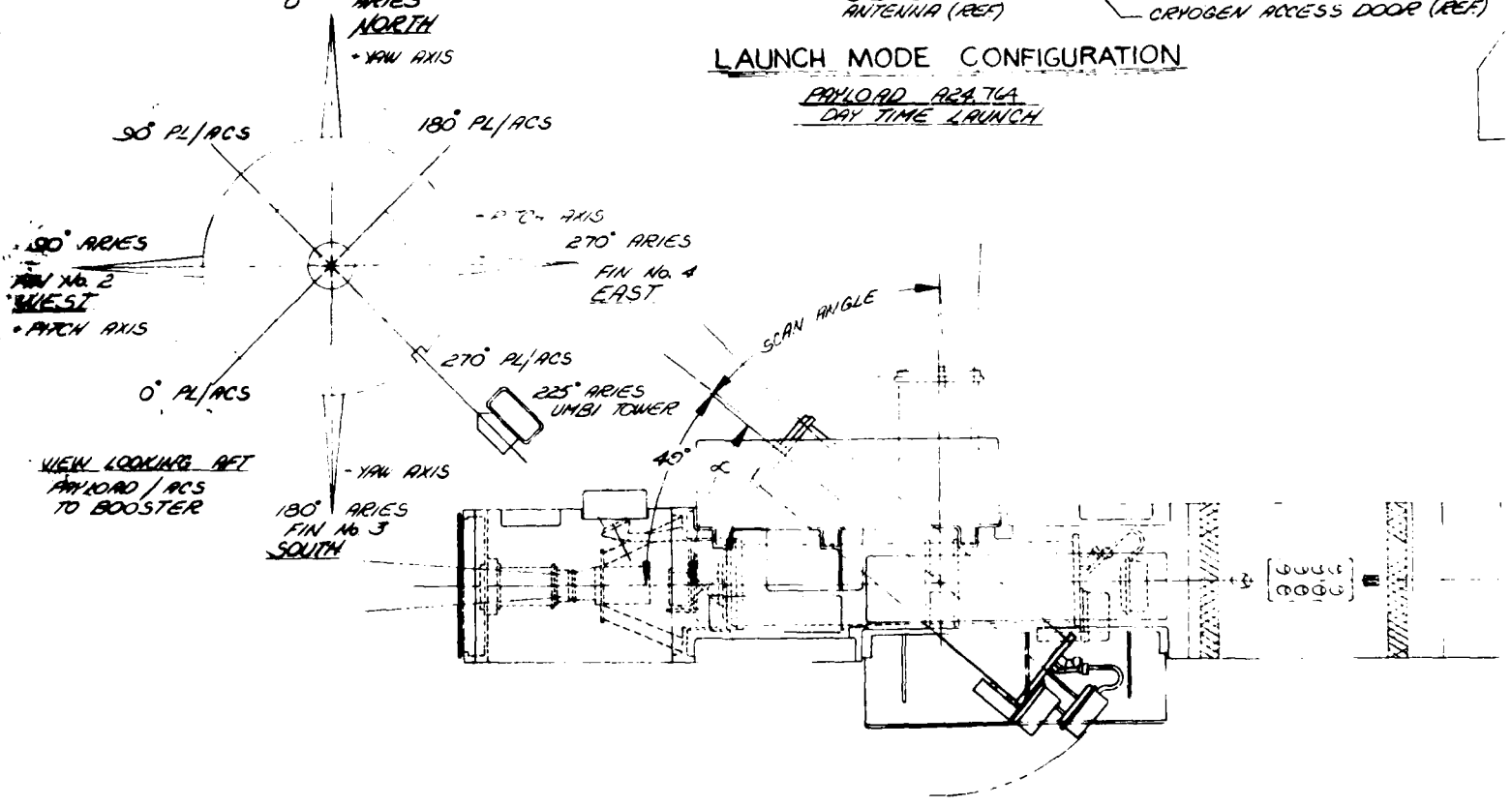

E-12909
8.0"×8.0" BLOW-OFF DOOR
PWR BOOM #1
SKIN WELDMENT
DWG #E-12853
10"×10" BLOW-OFF DOOR
H.I.V. BOOM
423.0
A
DOOR RELEASE
TYP 4 PLC'S
SEE DETAIL
0°
FWD JOINT
DWG #E-12857-1
AFT JOINT
DWG #E-12857-2
42.00 DIA
DECKPLATE
270°
225°
UMBILICALS
180°
A-A
VIEW LOOKING AFT
PSL 'S' BAND
ANTENNA (3.0W)
PSL 'S' BAND
ANTENNA (3.0W)
UMBILICAL
3 REQ'D
8.0"×8.0" BLOW-OFF DOOR
PWR BOOM #2
423.0
15.25
7.00
4.00
DENOTES DIRECTION OF FLIGHT
R. LUND
R. LUND
R. JACOBS
BEAR
AIR FORCE
GEOPHYSICS LABORATORY
T/M & PHYSICS
SECTION
(CONFIGURATION)
E-12909


E-12899
BOOM TRAVEL MOUNTING
SPRING MOTOR CABLE RESTRAINT
SENSOR CABLE
NRL SENSOR CABLE RELEASE
PRESSURE TANK 300 PSI 2 REQ'D
STIFFENER
SKIN .44 GE DIA
KICKER SPRING 2 REQ'D
CABLE CUTTERS HOLEX #6800
1/8 DIA ST ST 7-19 CABLE (1200# MIN BREAK)
SECONDARY
PRIMARY
BLOW-OFF DOOR
DOOR RELEASE MECHANISM
NOTE: PYROS EJECT WITH DOOR
POWER & SIGNAL CONNECTORS (HERMETIC)
TOP VIEW
NRL SENSOR WIT DWG #C-12894
O-RING SEAL
27.0
2.00 DIA.
BOOM ELEMENT (NON-CONDUCTIVE) WIT DWG #D-12780
78.13 ± .75 (DEPLOYED) (2 METER)
2.00
PURGE VALVE
PRESSURE MANIFOLD
19.50
PRESSURE KICKER 2 REQ'D
SOLENOID ON/OFF PRESSURE VALVE
6.93
4.63
BOOM ELEMENT HOUSING
SLED EJECT MECHANISM OUTLINE
4 CONNECTORS ARE TBD TENTATIVE
5 ALL PLUMBING FITTINGS ARE ST ST (COMPRESSION TYPE)
2 CALCULATED WT 23#
DENOTES PAYLOAD E
NOTES
MTV BOOM ASSEMBLY
E-12899E



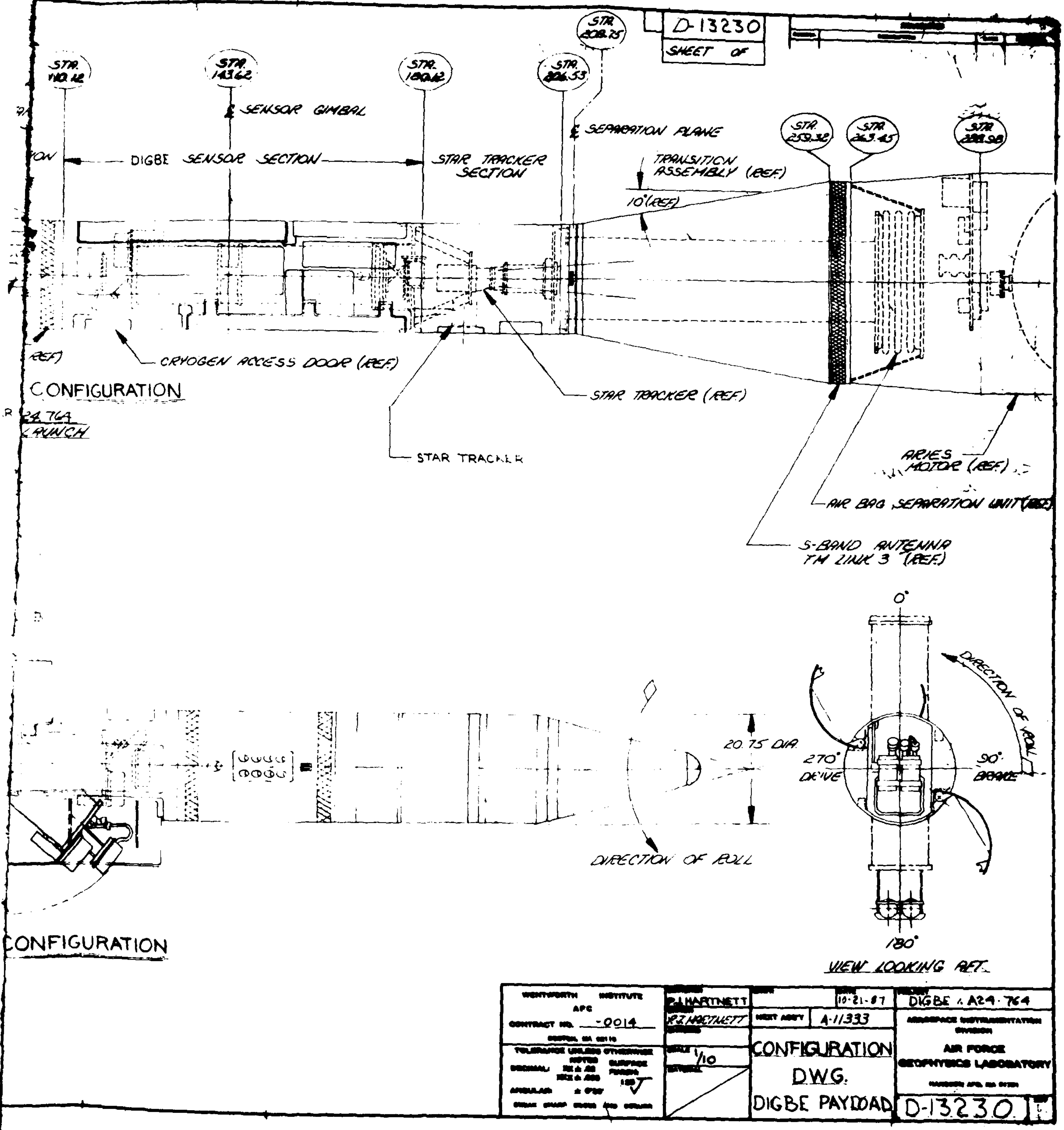
LAUNCH MODE CONFIGURATION

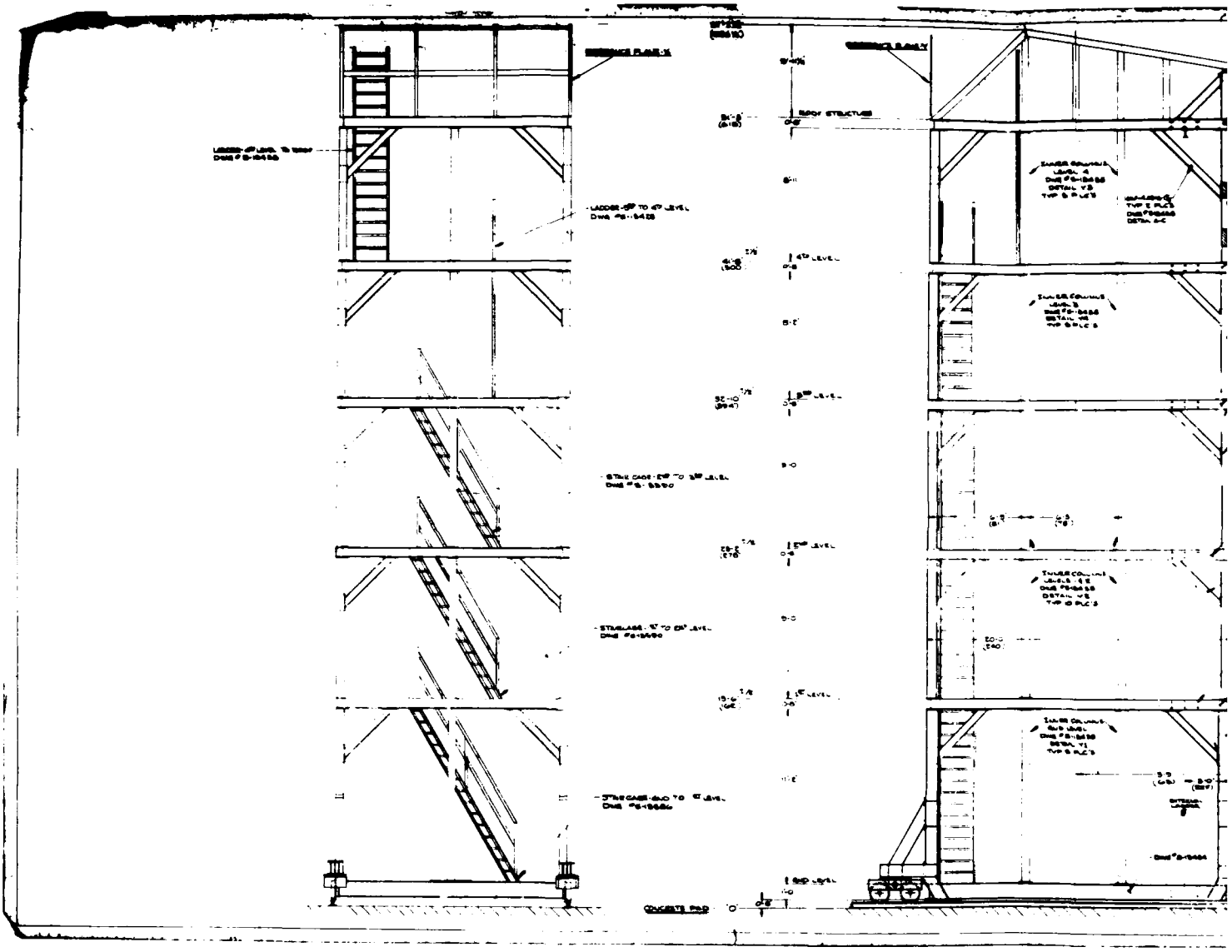
PAYLOAD A24.7GA
DAY TIME LAUNCH

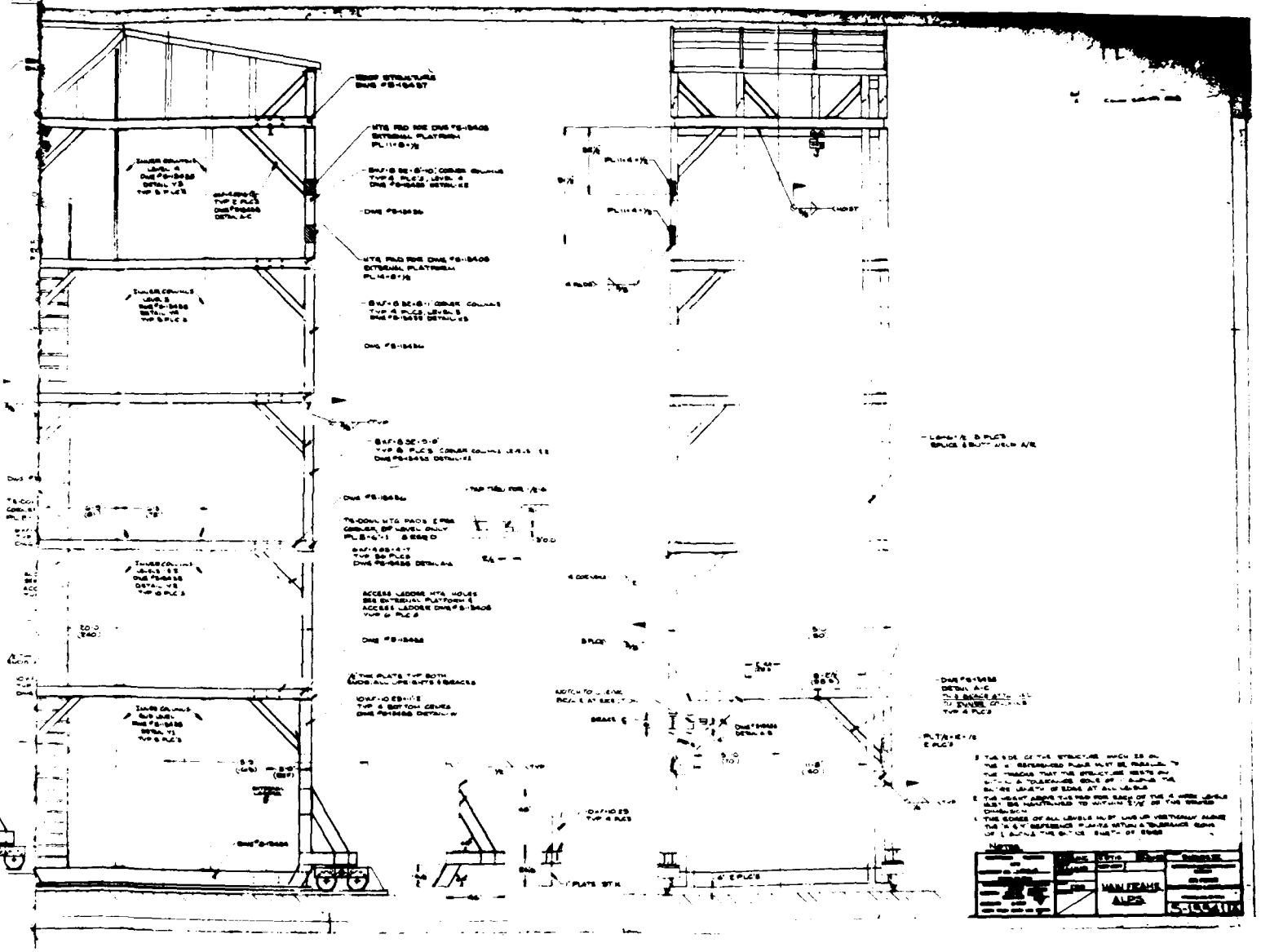


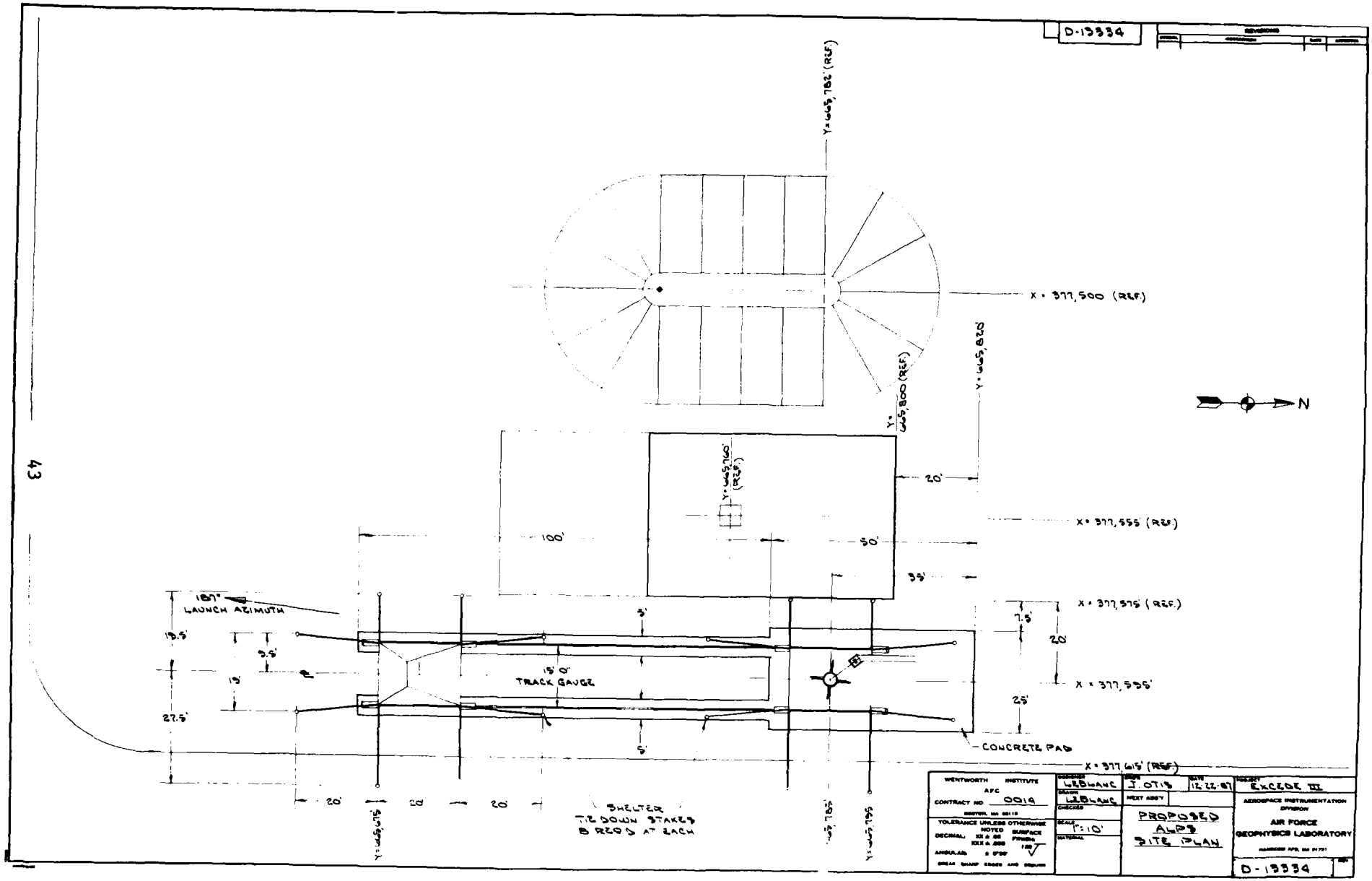
DATA MODE CONFIGURATION

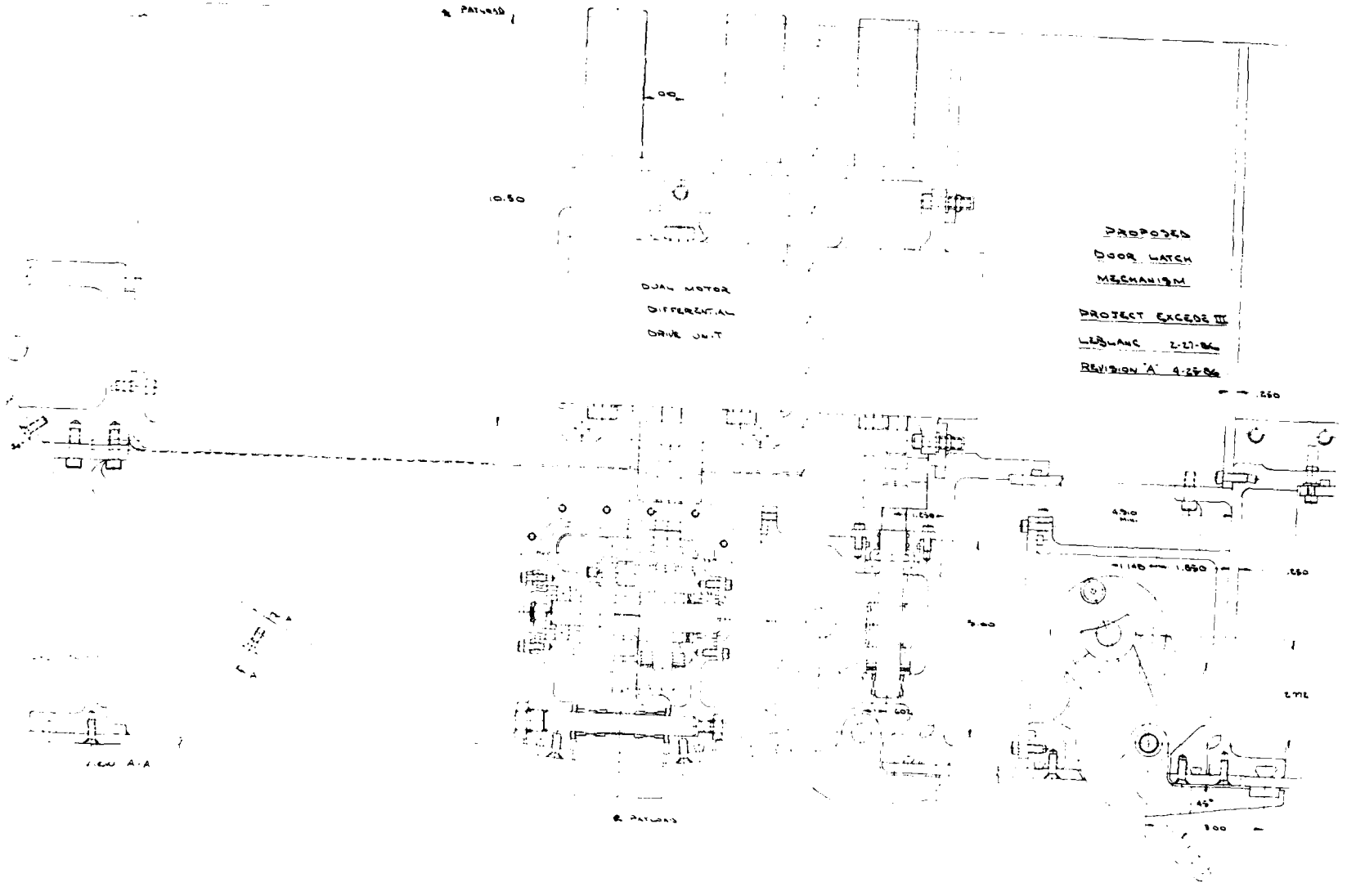
NOTE: 1. FOR LIST OF SYSTEM SEGMENTS, SEE SHEET 2 OF 2.

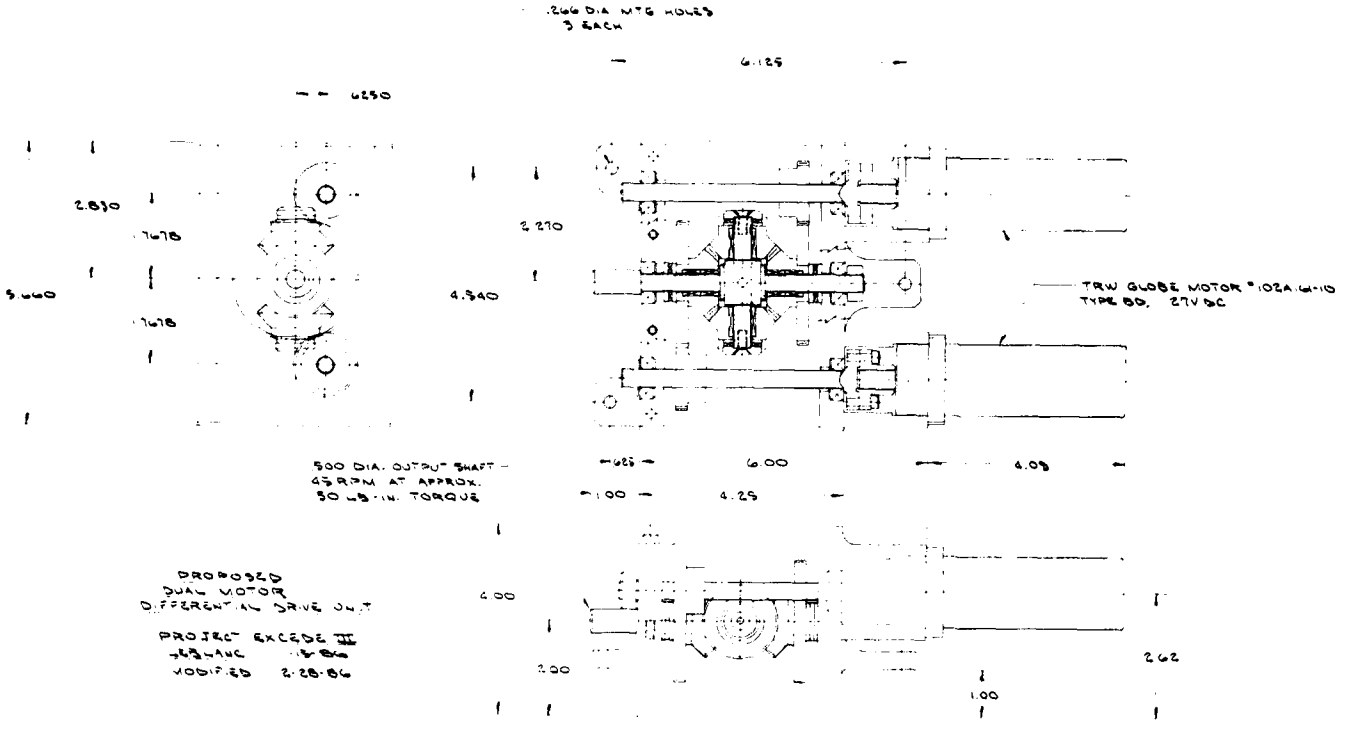

D-13230
SHEET OF
STA. 110.12
STA. 143.62
STA. 180.12
STA. 208.75
STA. 226.53
STA. 259.32
STA. 263.45
SENSOR GIMBAL
SEPARATION PLANE
DIGBE SENSOR SECTION
STAR TRACKER SECTION
TRANSITION ASSEMBLY (REF.)
10° (REF.)
CRYOGEN ACCESS DOOR (REF.)
STAR TRACKER (REF.)
STAR TRACKER
CONFIGURATION
LAUNCH
ARIES MOTOR (REF.)
AIR BAG SEPARATION UNIT (REF.)
S-BAND ANTENNA TM LINK 3 (REF.)
0°
DIRECTION OF ROLL
20.75 DIA.
270° DRIVE
90° BRAKE
180°
DIRECTION OF ROLL
CONFIGURATION
VIEW LOOKING AFT
WENTWORTH INSTITUTE
CONTRACT NO. -0014
P.J. HARTNETT
P.J. HARTNETT
10-21-87
NEXT ASSY A-11333
DIGBE A24-764
AIR FORCE GEOPHYSICS LABORATORY
1/10
CONFIGURATION DWG. DIGBE PAYLOAD
D-13230

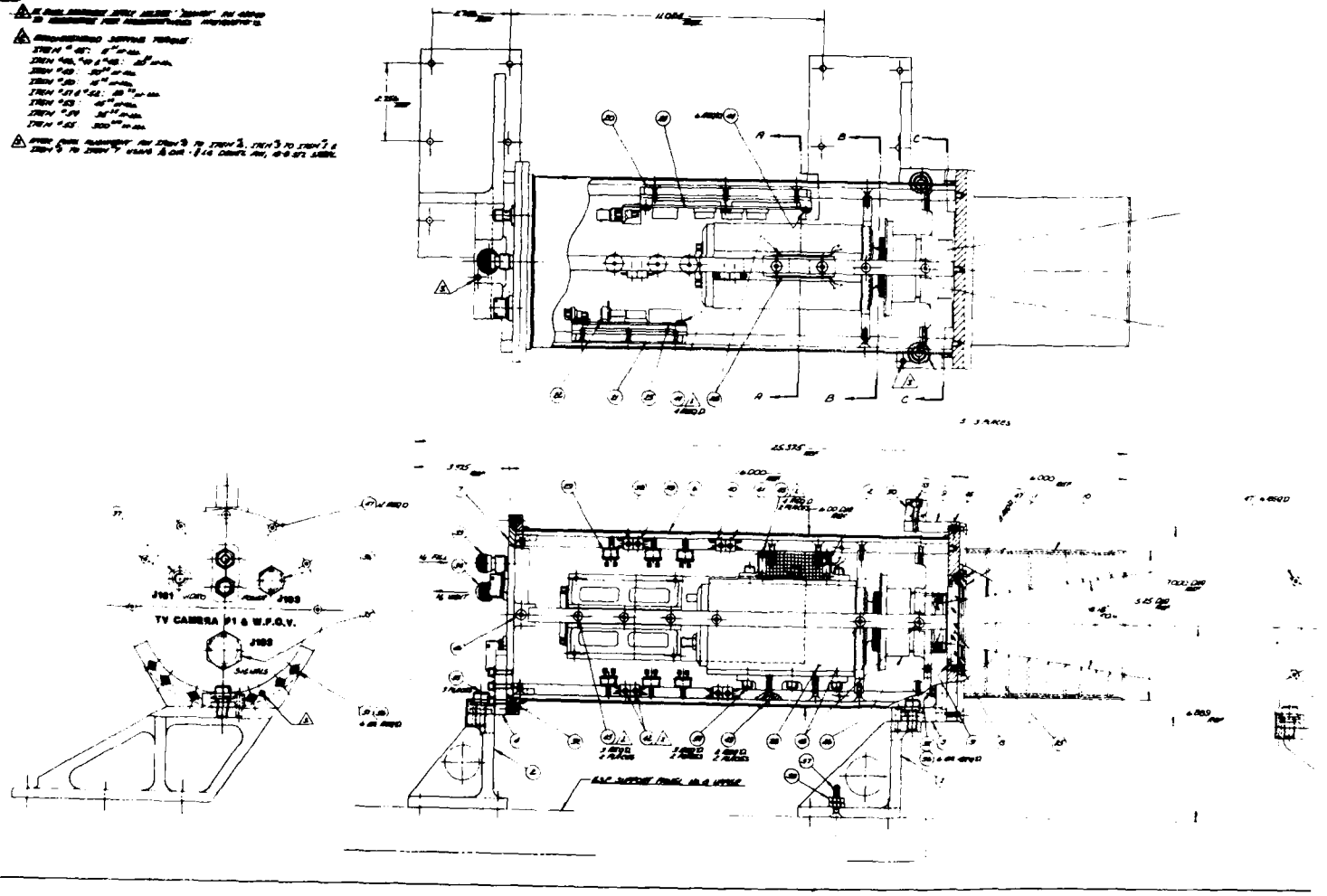


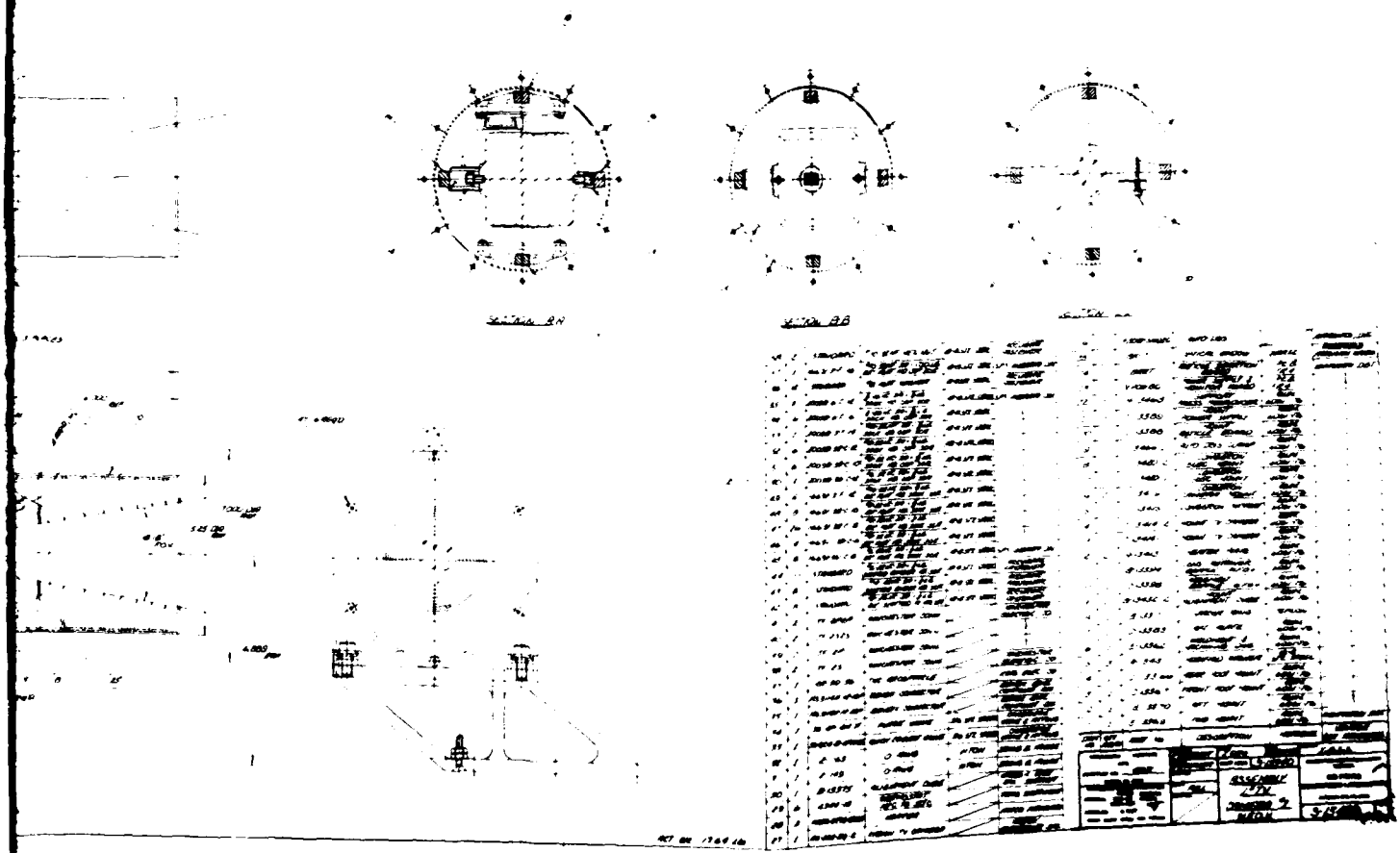


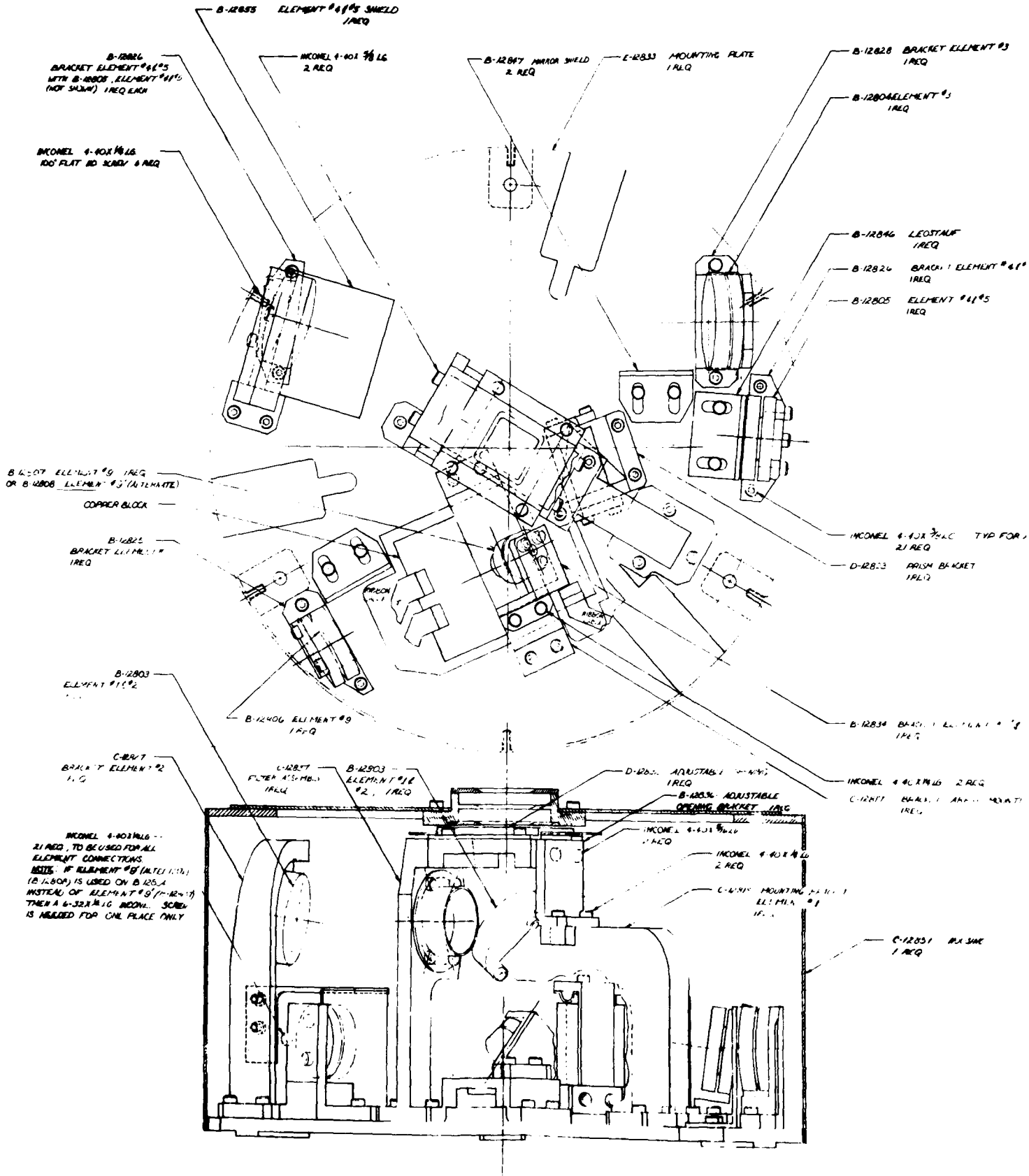

D-13334
Y = 445,782' (REF.)
X = 377,500 (REF.)
Y = 445,820
Y = 445,800 (REF.)
N
20'
Y = 445,760' (REF.)
X = 377,555' (REF.)
100'
50'
35'
181° LAUNCH AZIMUTH
X = 377,575' (REF.)
19.5'
3.5'
15'
27.5'
5'
15' 0" TRACK GAUGE
7.5'
20'
X = 377,595'
25'
CONCRETE PAD
X = 377,615' (REF.)
20'
20'
20'
SHELTER
TIE DOWN STAKES
8 REQ'D AT EACH
Y = 445,575'
Y = 445,785'
Y = 445,795'
WENTWORTH INSTITUTE
AFC
CONTRACT NO 0019
BOSTON, MA 02115
TOLERANCE UNLESS OTHERWISE NOTED
DECIMAL XX ± .02 SURFACE FINISH
XXX ± .005
ANGULAR ± 0°30'
BREAK SHARP EDGES AND BURRS
DESIGNED LEBLANC
DRAWN LEBLANC
CHECKED
SCALE 1" = 10'
MATERIAL
JOB J. OTIS
NEXT ASSY
DATE 12-22-81
PROPOSED ALPS SITE PLAN
PROJECT EXCEDE III
AEROSPACE INSTRUMENTATION DIVISION
AIR FORCE GEOPHYSICS LABORATORY
HANSCOM AFB, MA 01731
D-13334

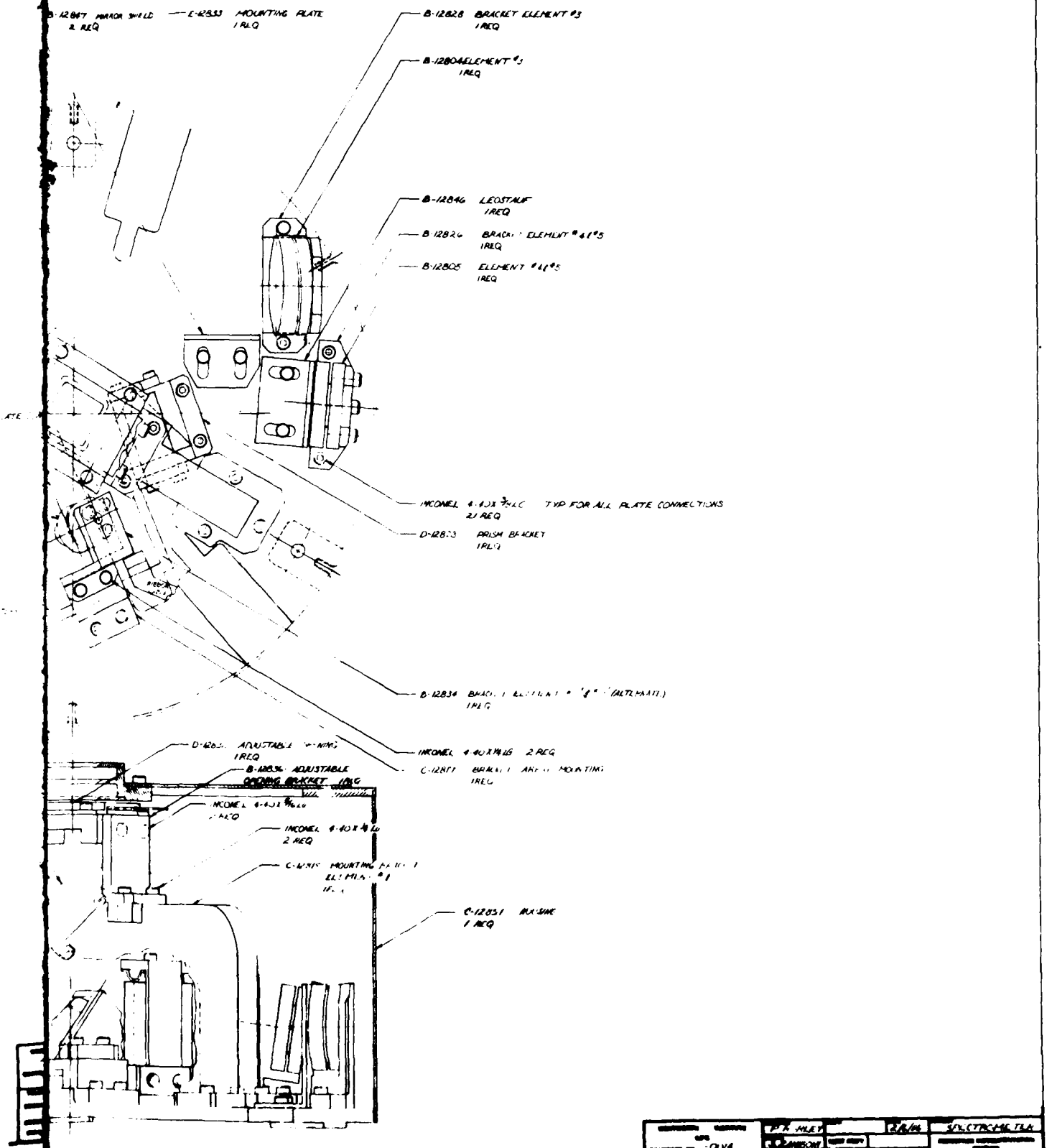

PROPOSED
DOOR LATCH
MECHANISM
PROTECT EXCEDE III
LEBLANC 2-27-86
REVISION 'A' 4-25-86
DUAL MOTOR
DIFFERENTIAL
DRIVE UNIT
10.50
VIEW A-A


.266 DIA MTG HOLES
3 EACH
6.125
6.250
2.830
.7678
5.660
.7678
2.270
4.340
TRW GLOBE MOTOR "102A-G-10
TYPE 80, 27V DC
.500 DIA. OUTPUT SHAFT -
45 RPM AT APPROX.
50 LB-IN. TORQUE
.625
6.00
4.09
1.00
4.25
PROPOSED
DUAL MOTOR
DIFFERENTIAL DRIVE UNIT
PROJECT EXCEDE III
MODIFIED 2-28-86
4.00
2.00
2.62
1.00

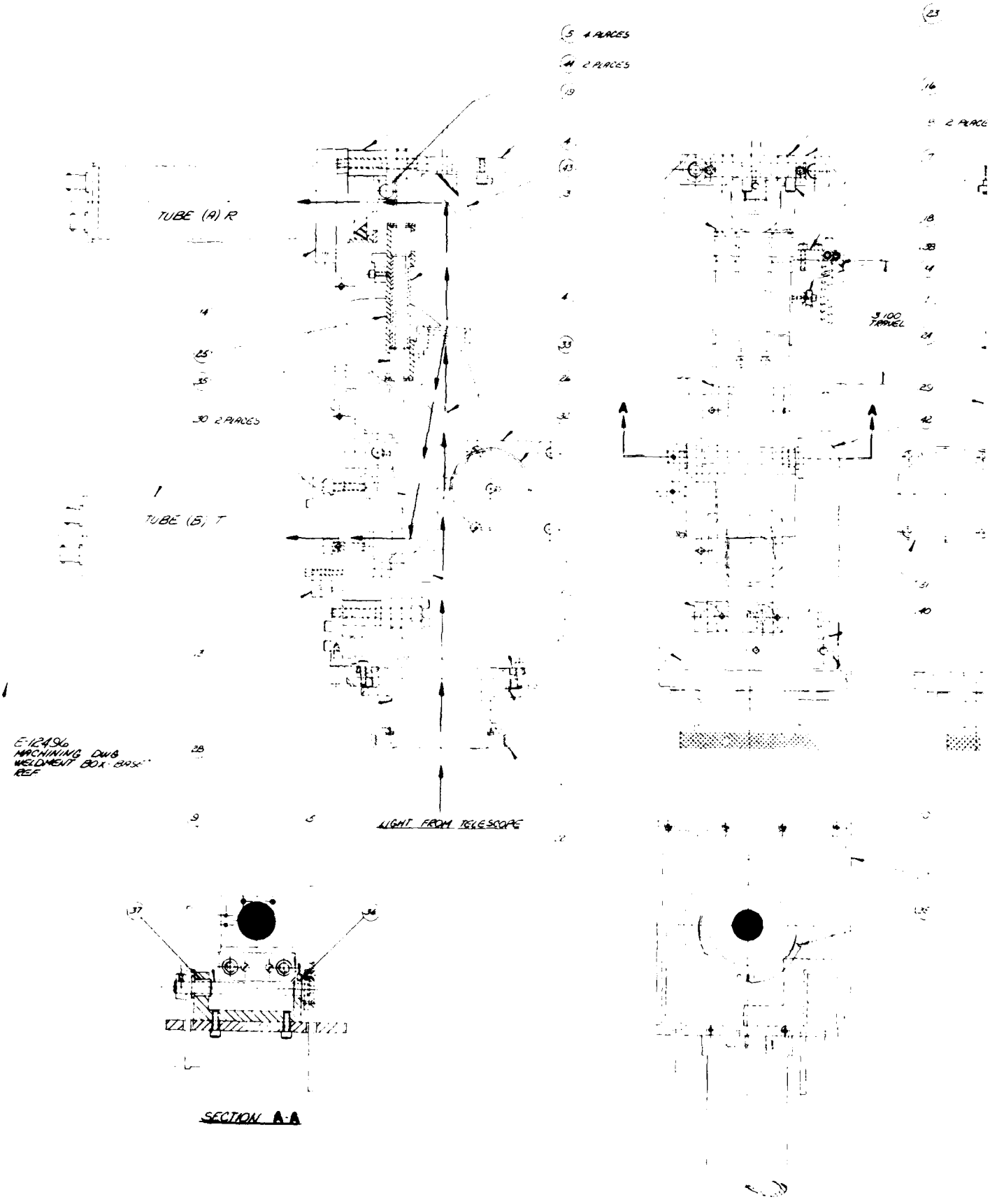

TV CAMERA #1 & W.F.O.V.



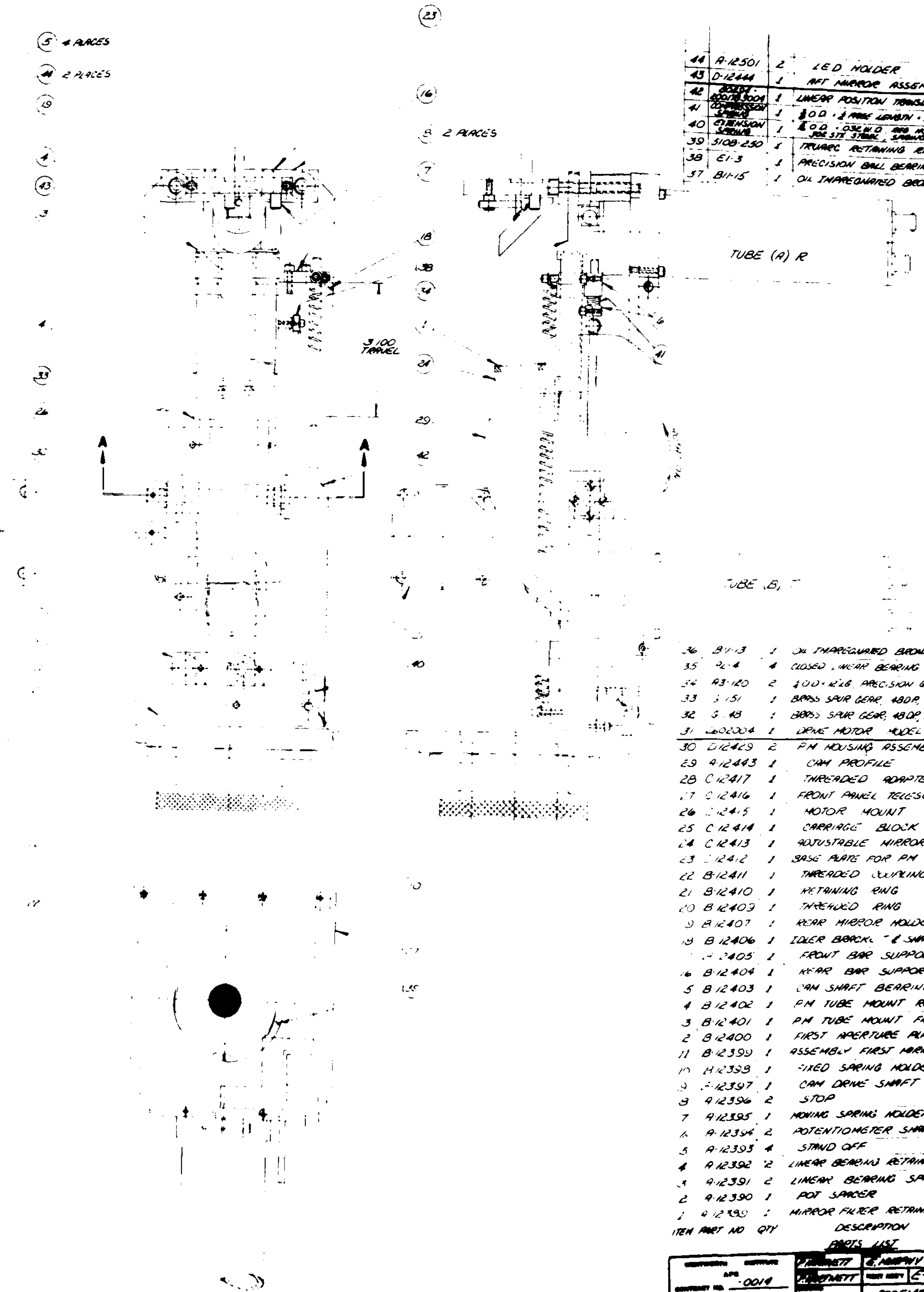

B-12855 ELEMENT #6 #5 SHIELD 1 REQ
B-12826 BRACKET ELEMENT #6 #5 WITH B-12808, ELEMENT #6 #5 (NOT SHOWN) 1 REQ EACH
INCONEL 4-40 X 3/8 LG 2 REQ
B-12847 MIRROR SHIELD 2 REQ
E-12833 MOUNTING PLATE 1 REQ
B-12828 BRACKET ELEMENT #3 1 REQ
B-12804 ELEMENT #3 1 REQ
INCONEL 4-40 X 3/8 LG 100° FLAT HD SCREW 6 REQ
B-12846 LEGSTALK 1 REQ
B-12824 BRACKET ELEMENT #6 #5 1 REQ
B-12805 ELEMENT #6 #5 1 REQ
B-12807 ELEMENT #9 1 REQ OR B-12808 ELEMENT #3 (ALTERNATE)
COPPER BLOCK
B-12825 BRACKET ELEMENT #1 1 REQ
INCONEL 4-40 X 3/8 LG TYP FOR 2 REQ
D-12813 PRISM BRACKET 1 REQ
B-12803 ELEMENT #1 #2
B-12406 ELEMENT #9 1 REQ
B-12834 BRACKET ELEMENT #3 1 REQ
C-12817 BRACKET ELEMENT #2 1 REQ
C-12877 FILTER ASSEMBLY 1 REQ
B-12903 ELEMENT #1 #2, 1 REQ
D-12814 ADJUSTABLE 1 REQ
INCONEL 4-40 X 3/16 LG 2 REQ
C-12877 BRACKET ASSEMBLY 1 REQ
B-12836 ADJUSTABLE OPENING BRACKET 1 REQ
INCONEL 4-40 X 5/16 LG 2 REQ
INCONEL 4-40 X 3/8 LG 2 REQ
C-12815 MOUNTING PLATE ELEMENT #1 1 REQ
C-12851 IRIS SHAFT 1 REQ
INCONEL 4-40 X 3/16 LG - 2 REQ, TO BE USED FOR ALL ELEMENT CONNECTIONS. NOTE: IF ELEMENT #9 (ALTERNATE) (B-12808) IS USED ON B-12825 A INSTEAD OF ELEMENT #9 (B-12407) THEN A 6-32 X 3/16 LG BRONZE SCREW IS NEEDED FOR ONE PLACE ONLY



-OLV4	P.R. MILEY	2/8/96	SYLECTRONICS, INC.
			PLATE ASSEMBLY
			S-12836


TUBE (A) R
TUBE (B) T
4 PLACES
2 PLACES
2 PLACES
3.100 TAPPED
LIGHT FROM TELESCOPE
E-102496
MACHINING DWG
WELDMENT BOX-BASE
REF
SECTION A-A

E-12440



ITEM	PART NO	QTY	DESCRIPTION	MATERIAL
44	A-12501	2	LED HOLDER	ALUM
43	D-12444	1	AFT MIRROR ASSEMBLY	SEE DWG
42	BOURNS 6001-3001	1	LINEAR POSITION TRANSDUCER, 20K, 4" TRAVEL	BOURNS, INC.
41	COMPRESSION SPRING	1	3/8 O.D. · 1/2 FREE LENGTH · .031 W.D., SPRING ST.	
40	EXTENSION SPRING	1	3/8 O.D. · .032 W.D. REG HOOK ENDS 4 3/8 FL 302 STL STEEL, SPRING TEMPER	BOSTON, MASS.
39	5108-250	1	TRUARC RETAINING RING	LONG IS. CITY, N.Y.
38	E1-3	1	PRECISION BALL BEARING, STL ST, ABEC-7	PIC CORP MIDDLEBURY CT.
37	B11-15	1	OIL IMPREGNATED BRONZE BEARING	PIC CORP MIDDLEBURY CT
36	B11-13	1	OIL IMPREGNATED BRONZE BEARING	PIC CORP MIDDLEBURY CT
35	PL-4	4	CLOSED LINEAR BEARING PL SERIES	PIC CORP MIDDLEBURY CT
34	A3-120	2	1/4 OD × 12.28 PRECISION GROUND SHAFTING	PIC CORP MIDDLEBURY CT
33	G 151	1	BRASS SPUR GEAR, 48DP, 192T, 4.0PD, 14 1/2 PA	BOSTON GEAR
32	G 48	1	BRASS SPUR GEAR, 48DP, 96T, 2.0PD, 14 1/2 PA	BOSTON GEAR
31	602004	1	DRIVE MOTOR MODEL T 2 RPM	ELECTRO SALES SOMERVILLE, MASS
30	D12429	2	PM HOUSING ASSEMBLY & DETAILS	SEE DWG
29	A-12443	1	CAM PROFILE	ALUM
28	C-12417	1	THREADED ADAPTER	ALUM
27	C 12416	1	FRONT PANEL TELESCOPE	ALUM
26	C 12415	1	MOTOR MOUNT	ALUM
25	C 12414	1	CARRIAGE BLOCK	ALUM
24	C 12413	1	ADJUSTABLE MIRROR HOLDER	ALUM
23	C 12412	1	BASE PLATE FOR PM TUBES	ALUM
22	B-12411	1	THREADED COUPLING	ALUM
21	B-12410	1	RETAINING RING	ALUM
20	B 12409	1	THREADED RING	ALUM
19	B 12407	1	REAR MIRROR HOLDER	ALUM
18	B 12406	1	IDLER BRACKET & SHAFT GRABBER	ALUM
[illegible]	[illegible] 2405	1	FRONT BAR SUPPORT	ALUM
16	B-12404	1	REAR BAR SUPPORT	ALUM
15	B 12403	1	CAM SHAFT BEARING BLOCK	ALUM
14	B 12402	1	PM TUBE MOUNT REAR RING	ALUM
13	B-12401	1	PM TUBE MOUNT FRONT RING	ALUM
12	B 12400	1	FIRST APERTURE PLATE	ALUM
11	B-12399	1	ASSEMBLY FIRST MIRROR MOUNT	SEE DWG
10	B 12398	1	FIXED SPRING HOLDER	ALUM
9	A-12397	1	CAM DRIVE SHAFT	SEE DWG
8	A 12396	2	STOP	303 STL ST
7	A-12395	1	MOVING SPRING HOLDER	ALUM
6	A-12394	2	POTENTIOMETER SHAFT CLAMP	ALUM
5	A-12393	4	STAND OFF	ALUM
4	A 12392	2	LINEAR BEARING RETAINER PLATE	ALUM
3	A-12391	2	LINEAR BEARING SPACER	ALUM
2	A-12390	1	POT SPACER	ALUM
1	A 12389	1	MIRROR FILTER RETAINING PLATE	ALUM

SUPPLIER

PARTS LIST

CONTRACT NO. -0014	P. BARNETT	E. MURPHY	SCINTILLOMETER
	P. BARNETT	E-12375	AIR FORCE GEOPHYSICS LABORATORY
	FULL	ASSEMBLY DRIVE MECHANISM STELLAR SCINTILLOMETER	E-12440